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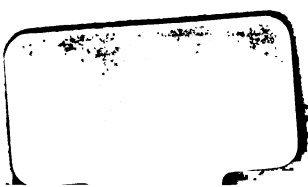

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# REFLECTIONS

ON THE

# WORKS OF GOD,

IN THE VARIOUS KINGDOMS OF

# NATURE,

AND ON

## THE WAYS OF PROVIDENCE,

DISPLAYED IN THE GOVERNMENT OF THE UNIVERSE.

Translated from the German

OF

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# *REFLECTIONS*

ON THE

# WORKS OF GOD,

*&c. &c.*

## *JULY.*

### HYMN OF PRAISE TO THE AUTHOR OF NATURE.

HOW great art thou, O Eternal! O my God! This terrestrial globe announceth thy majesty; the heavens are the throne of thy glory. Thou saidst: Let them be—and at thy word they were spread forth in boundless space.

The thunder proclaimeth thy praises; and, clad in formidable majesty, thou ridest upon the swift-winged lightning. In the splendor of the sun I perceive thy glory, and in the flowers which adorn our fields I discover the traces of thy hand.

Is there a God like unto our God? Who walketh upon the winds; who launcheth the thunder, and commandeth the lightning to illumine the recesses of the forest?

It is thou, and thou alone, O Lord! Thousands of worlds glorify thee; it is thou who hast given them existence; but at thy nod they disappear, are annihilated, or clothed with a new form.

All creation is a temple reared to thy glory, whence incessant praise ascends to thee; where

millions of celestial spirits, with profound admiration, attune to thee their immortal anthems.

From the seraph who beholds thy face, to the worm that creepeth upon the earth, every thing celebrates thy glory. The creatures which now exist, and those which have not yet received existence, are alike within the limits of thy dominion, are alike subjects of thy empire.

What is man, the offspring of the dust, that thou shouldst think of him with such loving-kindness? O God, in whom I have put all my trust, I adore and bless thee for the mercies thou hast bestowed upon me.

Thou hast placed me in a highly exalted rank. The inhabitants of the sea and of the air, of the forests and of the fields are subject to me; all the creatures of this terrestrial globe acknowledge me their sovereign.

How magnificent is thy name, O Most High! Thy praise resounds to the limits of the universe; thy works shall proclaim thy glory from eternity to eternity!

## *JULY* 1.

### MIGRATORY PLANTS AND VEGETABLES.

ALL the different species of grain, and a great number of our vegetables were originally brought from foreign countries, and, in general, from hotter climates than our own. Most of them came from Italy; Italy received them from the Greeks, and the Greeks had them from the East. When America was discovered, a multitude of plants and flowers, till then unknown, were found in that con-

tinent; they were transplanted to Europe, where they now thrive perfectly well: and the English still take great pains to cultivate in their country various species of plants from North America.

Most of the different kinds of corn, which form the best nutriment for men and animals, are gramineous plants; but, though they now cover our fields, they are nevertheless of foreign extraction. Rye and wheat are indigenous in Little Tartary and Siberia, where they still grow spontaneously. As to barley and oats, we know not from what country they originally came; but so much is certain, that they are not natives of this climate, otherwise we should have no occasion to cultivate them. Rice is a production of Ethiopia, whence it was carried into the East, and from the East into Italy. Since the commencement of the last century it has been cultivated in America, and whole shiploads are now imported from that country into Europe. Buck-wheat is an Asiatic production, which was introduced at the time of the Crusades into Italy, and thence spread over the rest of Europe.

Most of our culinary vegetables have a similar origin. Borage is a native of Syria, the cress of Crete, the cauliflower of Cyprus, and asparagus of Asia. We are indebted to Italy for the chervil; to Spain and Portugal for the dill; to the Canary Islands for fennel; and to Egypt for anniseed and parsley. Garlic is a production of the East; the shallot comes from Siberia; and horse-radish from China. Kidney-beans were brought from the East Indies; the gourd from Astracan; the lentil from France; and the potatoe from Brasil. The tobacco

plant was found by the Spaniards in the province of Tabaco, in the American kingdom of Jucatan.

The most beautiful flowers that embellish our gardens are also natives of foreign climes. The jessamine comes from the East Indies; the tulip from Cappadocia; the narcissus from Italy; the lily from Syria; the tube-rose from Java and Ceylon; the carnation from Italy; and the aster from China.

Let us then contemplate these gifts of our celestial benefactor with gratitude and joy. How bountifully hath God provided for our happiness and pleasure, in thus making the remotest regions of the earth tributary to our comfort and support. Hence, also, let us learn the nature of the earth we inhabit. A universal migration obtains over the whole surface of the globe. Men, animals, and plants remove from one country to another; and as long as the earth subsists these migrations shall continue.

O my God, wherever thou mayst think fit to place me, I will endeavor to fulfil the duties of my station. I will labor for the advantage, not only of my contemporaries, but even of posterity, till I shall be transplanted to those regions of perfection and bliss, which shall never know vicissitude nor change.

## *JULY 2.*

### METAMORPHOSIS OF CATERPILLARS.

THE transformation of caterpillars into butterflies is certainly one of the most wonderful phenomena

Metamorphosis of caterpillars.

of Nature. It is entitled on various accounts to our most attentive consideration. The manner in which caterpillars prepare for this change is highly astonishing. They are not transformed directly into butterflies, but first pass through an intermediate state. After shedding its skin three times, the caterpillar at length changes its form, and is metamorphosed into an object which has not the least appearance of being a living creature. It is enclosed in a hard case, and is called a chrysalis. In this state it remains a week, a fortnight, or a month, and sometimes three, six, or ten months, till at length a butterfly issues from the shell.

There are, properly speaking, two classes of papilionaceous insects: butterflies, and *phalænæ*, or moths. In the one the wings are erect; in the other drooping. All the species of the former fly during the day, but the latter almost exclusively confine their excursions to the night. The caterpillars from which the moths are produced, when the period of their transformation approaches, either enclose themselves in a bag, which they spin for the purpose, or bury themselves in the ground. All those which are destined to become butterflies, suspend themselves in the open air on trees, plants, rails, walls, or any other object of that kind. For this purpose they spin a very small web, with an extremely fine thread, and then suspend themselves by the heels, with the head turning upward. Some species of this class, for instance, all the kinds of hairy caterpillars, remain in this state perpendicular with their heads downward; others spin a fine thread, which goes round the middle of the body, and is fastened at both ends. In one of these two ways all the butterfly caterpillars prepare

for the great change which they are to undergo. Thus both kinds of caterpillars bury themselves alive, and seem quietly to wait the termination of their caterpillar state, as though they knew that, after a short period of repose, they should receive a new existence, and appear again in a much more brilliant form.

Nothing in Nature bears so striking a resemblance to the death of the righteous and their resurrection, as the transformation of a caterpillar into a butterfly. To the virtuous death is but a slumber, a repose after the pain and sorrows of this turbulent world; a moment in which they are deprived of motion and life, that they may again appear in a more glorious form, and enter upon a new state of existence. What is a caterpillar? A creeping, blind, and despised worm, which, while it crawls through life, is incessantly exposed to accidents and persecutions. And is the condition of man in the world much better?

A caterpillar prepares with the greatest care for its transformation, and for that state of torpor upon which it is shortly to enter; so also doth the good man. Long before death arrives, he prepares himself for the change, and awaits with tranquil joy the moment which shall remove him into a better state.

The apparent suspension of life in the caterpillar is not everlasting, but only the precursor of higher perfection. After its metamorphosis it appears one of the most beautiful of insects. Before, it crept upon the earth; now, by means of its wings, it can fly aloft into the air. Before, it was blind; now it is provided with excellent eyes, and enjoys a thousand agreeable sensations, to which it was hereto-

fore a stranger. Before, it fed upon the coarse substance of the leaves; now, it sips the delicious nectar of the flowers, and lives in a perpetual round of pleasures. In all these respects I perceive the most striking resemblance to the death and resurrection of the pious. He dies that he may soon live again. His frail, earthly body will appear on the great day of resurrection, perfect, glorious, and resplendent. As a mortal man he was attached to the earth, and his mind was occupied with merely sensual objects and pursuits; but after he has put off mortality, his spirit soars among myriads of worlds, his more powerful vision embraces the whole extent of Nature, and he advances into the presence of the Deity himself. Before death, he was blind in the investigation of truth, but now his eye penetrates into its profoundest recesses. His body is spiritual, glorified, and totally different in its nature from that which he has relinquished; hence he is no longer a slave to base passions, or exposed to hunger and thirst. Other sensations now constitute his felicity; he revels in purer joys, and is regaled with celestial nourishment.

If such, O Christian, be the bliss which awaits thee, and if thy present existence be nothing but a kind of caterpillar state, how important is the lesson which it inculcates. Since human life is so frail and fleeting, consider it not as thy final destination, and conduct not thyself, during this momentary existence, as though it were to last for ever.

The silk-worm.

## JULY 3.

### THE SILK-WORM.

The republic of caterpillars which are transformed into the two great classes of butterflies and moths, is divided into various families, each of which has its peculiar characters and properties. One of these families is distinguished by the appellation of the silk-worm. Like the other caterpillars it is composed of many moveable rings or joints. It is provided with feet and claws, that it may fix itself wherever it pleases. In its mouth it has two rows of teeth, which do not work up and down upon each other, as in man, but by a motion from right to left. With these the insect holds fast, cuts and tears the leaves. Along the whole length of the back we perceive through the skin a vessel which from time to time expands, and performs the functions of the heart. On each side it has nine orifices, which conduct to the same number of lungs, and promote the circulation of the juices. Under the mouth the silk-worm has a kind of reel, with two holes, through which it presses two drops of the fluid gum which fills its long intestinal canal: these are continually furnishing the material for spinning. The gum which distils through the two apertures takes the measure of its thickness from them, and is spun out into a double thread, which instantly acquires such consistency, that the worm may securely suspend, or at the proper time envelop itself with it. These two threads it presses together with its fore feet, and forms into one, which is not only extremely fine, but also very strong, and of astonishing length. Each cocoon is

composed of a thread, five hundred ells in length, and, as each thread is double, each of these bags must contain a thousand ells, though it weighs no more than two grains and a half."

The life of this insect in its vermiform state is very short, but it is nevertheless subject to various changes, which bring it gradually nearer to perfection. The worm, on leaving the egg, is extremely small, perfectly black, and the head of a still more brilliant black than the rest of the body. In a few days it changes to a light or ash color; his coat then becomes dirty and wrinkled. In about eight days, during which period he has grown to the length of a quarter of an inch, he is attacked with his first sickness, which consists in a kind of lethargic sleep, of three days' continuance. In this interval he refuses his food, and changes his skin, preserving the same bulk. His hue then becomes much paler, and greenish, from the color of his food. In a few more days, generally five, though sometimes more and at others less, according to the temperature, food, and constitution of the worm, he again ceases to eat, passes two days in a lethargic state, winds and contorts himself with such force, that the whole body appears almost entirely red with the effort; the skin becomes wrinkled, and he casts it off a second time, together with the feet. Thus in the space of three weeks or a month, he is covered with a third coat. He again begins eating, and might then be taken for a different creature, so great is the alteration in his head, color, and whole appearance. After he has continued to eat for some days, the lethargy again overtakes him, at the expiration of which he changes his skin the third time. He then eats for a few

The silk-worm.

days longer, till he desists entirely from feeding, and draws out a thread, in which he envelops himself, nearly in the same manner as we might wind thread round an oval piece of wood. In this receptacle, thus formed of the fine silken threads, the insect quietly remains in the state of a chrysalis, and in a fortnight would issue from its shell, were it not killed by exposure to the heat of the sun, or of an oven. The silken bags or cocoons are then put into hot water, and stirred with twigs to draw out the ends of the threads, which are wound off on a reel made for the purpose.

Thus to a worm or a caterpillar are we indebted for our greatest luxury in dress. The gum of which its web is composed furnishes us with all our silks and velvets—a reflection well calculated to humble our pride. What! Canst thou be vain of the silk that covers thee! Reflect to whom thou owest it, and how little thou art capable of contributing to the splendor of thy dress. Consider how often the most insignificant objects are designed for the advantage or the ornament of man. A worm, which we scarcely condescend to look at, becomes a blessing to whole regions, and a source of wealth. But how must the sight of these insects put many people to shame! The majority of mankind resemble them in passing a great portion of their lives in eating and drinking; but how few are there who by their labors confer benefit on the world! Let us, my brethren, with generous zeal exert our faculties and our energies for the advantage of our fellow-creatures, and strive, with equal disinterestedness, to promote their felicity.

## *JULY 4.*

### THE RAINBOW.

When the sun shines upon falling drops of rain, and we are placed in such a direction that we see the cloud from which the rain proceeds before us, and have the sun behind our backs, we perceive a rainbow. The drops of rain may be considered as transparent globules, in which the rays of the sun fall, are twice refracted and once reflected. Hence arise the colors of the rainbow; they are seven in number, and follow each other in the following order. The red color occupies the lowest place; then come orange, yellow, green, blue, purple, and violet. The darker is the cloud which covers the sky behind, and the closer the drops fall, so much the more vivid will be the colors of the bow. As the drops keep continually falling, the spectator sees a new rainbow every moment, and as each observes these falling drops from a different situation, it is impossible for him to see the same bow as another, but he beholds one totally different and distinct from those seen by the persons around him. This meteor can only last while the falling drops are succeeded by others.

Considering the rainbow merely as a natural phenomenon, it is the most magnificent display of the colors of Nature that the Creator has exhibited: but when I reflect that God hath made this meteor a memorial of his mercy, I can discover in it more than one subject for edification. When the rain descends over the whole horizon, no rainbow can possibly be formed. Whenever, therefore, we perceive a rainbow, we may rest assured that there is

no reason to apprehend a deluge, since, in that case, the clouds would not gradually pass away, but would pour forth their torrents over every part of the earth at once. Thus, when the sky is covered with rain-clouds only in one quarter, and the sun appears in another, it is a sign that these clouds are dispersing, and that the heavens will soon again become serene. Hence also it is, that no rainbow is to be seen, unless we have rain before us and sunshine behind. Thus it is necessary that there should be rain and sunshine at the same moment. We should see no colors if the sky were too clear; and for this reason, that part of the horizon where the rainbow appears must be covered with dark clouds. Neither could there be any rainbow without the action of the sun and the refraction of his rays. If we take all these circumstances into consideration, they will naturally suggest many edifying reflections.

Whenever this beauteous arch decorates the heavens, I will think: How majestic is the Lord in all the works of his hand! How great is his tenderness toward his creatures! I now see that the Almighty remembers this world in mercy. Let all flesh adore him, who so graciously keepeth the covenant he hath made. He hath not yet annihilated the world. To him be given praise and adoration for ever and ever.

But I observe another circumstance which may suggest useful reflections. Before me I have rain, and behind me sun-shine. This is an emblem of my life. Though my eyes oft overflow with tears, yet "the sun of righteousness ariseth upon me with healing in his wings." (*Mal.* iv. 2.)

Nests of birds

## JULY 5.

### NESTS OF BIRDS.

THE structure of birds' nests exhibits many remarkable circumstances, which cannot be uninteresting to a mind eager after knowledge. Are not these edifices, so diminutive, yet so regular, composed of so many different materials, selected with such care, arranged and constructed with such industry, neatness, and ingenuity, with no other instruments than a bill and two feet, justly entitled to our admiration? That human hands can erect magnificent buildings, according to the rules of art, is not so astonishing, when we consider the understanding with which the artists are endued, the implements of various kinds with which they can facilitate their operations, and the materials which they possess in such abundance, as that a bird, in want of almost every thing necessary for such an undertaking, should with his bill and his feet only be able to combine so much elegance, solidity, and regularity in the construction of his nest.

This subject, therefore, deserves a more attentive consideration. How curious is the structure of the nest of the goldfinch or chaffinch! The inside of it is lined with cotton, and fine silken threads; and the outside cannot be sufficiently admired, though it is composed only of various species of fine moss, with which the whole exterior surface of the nest is interwoven, and covered with the utmost art. The color of these mosses, generally resembling that of the bark of the tree on which the nest is built, proves that the bird intended it should not be easily discovered. In some nests hair, wool,

and rushes are dexterously interwoven. In some, all the parts are firmly fastened by a thread, which the bird makes of hemp, wool, hair, or more commonly of spiders' webs. Other birds, as for instance, the blackbird and the lapwing, after they have constructed their nest, plaster the inside with mortar, which cements and binds the whole of it together; they then stick upon it, while quite wet, some wool or moss, to give it the necessary degree of warmth. The nests of swallows are of a very different construction from those of other birds. They require neither wood, nor hay, nor cords; they make a kind of mortar, or rather, of cement, with which they form a neat, secure, and comfortable habitation for themselves and their family. To moisten the dust, of which they build their nest, they dip their breasts in water, and shake the drops from their wet feathers upon it. But the nests most worthy of admiration are those of certain Indian birds, which suspend them with great art from the branches of trees, to secure them from the depredations of many animals and insects. In general, every species of birds has a peculiar mode of building. Some construct their nests in houses, and others in trees; these among the grass, and those in the ground; but always in the way that is best adapted to their security, the rearing of their young, or other objects intimately connected with the preservation and welfare of their species.

Such is the wonderful instinct of birds with respect to the structure and disposition of their nests, which are sufficient to convince us that they are not mere machines. What ingenuity and intelligence, what skill and sagacity, what industry and patience do they display in the construction of their

nests! And is it not apparent that all their labors tend towards certain ends? They construct their nests hollow, and nearly hemispherical, that they may retain the heat so much the better. Some are covered externally with more, some with fewer coarse materials, not only for the purpose of strengthening the nest, but also to defend it. Internally it is lined with the most delicate substances, on which the young may lie soft and warm. Is it not something nearly approaching to reason that teaches the bird to place her nest in such a situation as to be sheltered from the rain, and secure against the attacks of other animals? How did she learn that she should lay eggs, that eggs would require a nest to prevent them from falling to the ground, and to keep them warm? Whence does she know that the heat would not be concentrated and maintained around the eggs, if the nest were too large; and that, on the other hand, the young would not have sufficient room if it were smaller? By what rules does she determine the due proportions between the nest and the young, which are not yet in existence? Who has taught her to calculate the time with such accuracy that she never commits a mistake, and produces her eggs before the nest is ready to receive them? All that has yet been advanced by way of reply to these questions, is far from affording any satisfactory explanation of these phenomena.

Of what nature soever the faculties of birds may be, so much is certain, that these wonderful instincts implanted in animals are the effect of supreme power and wisdom. And as the animals are not capable of attaining to the knowledge of their

Creator, let us be the more solicitous to improve ourselves in this knowledge, and to employ all our faculties for the glory of his great and holy name.

## *JULY 6.*

### DIVERSITY OF PLEASURES AFFORDED BY NATURE.

To what part soever of the creation I direct my view, I find something either to interest or gratify my senses, my imagination, or my reason. All Nature is calculated to present me with the utmost diversity of delightful objects. My taste for variety is continually excited and continually gratified. There is no part of the day but what affords the purest pleasures to my senses or my mind. While the sun illumines the horizon I am amused with the sight of the animal or vegetable creation; and at night the majesty of the celestial orbs fills me with rapture. On every side Nature is actively employed in procuring me new enjoyment and delight. Even a worm, a leaf, a grain of sand presents a world, constructed with the utmost skill, and replete with beauty. He who is not struck with this variety, and does not discover in it the bounty of his Creator, must be destitute alike of eyes and understanding. The same stream that waters the valley, lulls me to repose, delights my ear, and allays my thirst. The same shady forest which protects me from the scorching rays of the sun, and in which I listen to the varied strains of its feathered tenants, likewise contributes toward the supply of my table. The same trees whose blossoms so lately delighted me, will soon yield the most delicious

Diversity of pleasures afforded by Nature.

fruits, and the fields, covered with waving corn, assure to me an abundant subsistence.

Nature does not present to our view any object but what is pleasing and useful in more espects than one. Her tender care caused her to select green as the color wherewith to clothe the earth. This was sufficient to gratify the eye, but not to such a degree as variety is capable of delighting it. Hence the numberless gradations and shades of this color. Each family of plants has its peculiar and hereditary hue. The landscape, covered with woods and groves, plants, herbage, and corn, presents the most beautiful variety of verdure, in which its multifarious shades are here softly blended, there form the most clashing contrast, but yet every where display the most admirable harmony.

Each month of the year presents us with new plants and flowers. Those which decay are replaced with others, and they appear in succession, that there may never be any void in the vegetable kingdom.

To whom am I indebted for the manifold gifts of Nature? Who is it that hath so bountifully provided for my pleasures and my wants? Go, ask all Nature; the hill and the valley will inform thee. The earth delineates his image, and the heavens are his mirror. The storm announces his majesty; the bow stretched in the atmosphere, the snow and the rain proclaim his glory. The verdant mead, the field covered with golden grain, the mountains clothed with forests, whose summits are lost in the clouds, the tree bending beneath its fruit, the gardens enamelled with flowers, the mild beauties of the rose, bear the impress of his hand.

The birds celebrate him in their melodious strains; the sportive lamb; the stag bounding in the recesses of the forest; the worm that crawls in the dust; the monarch of the waves, who spouts rivers from his nostrils, and whelms the frail bark beneath the billows; the fearful crocodile; the elephant, that carries towers on his back; and all the animals inhabiting the air, the earth, and the sea, declare the glory of God, and proclaim his existence.

How inexcusable should we be, were we to disregard this universal testimony of Nature! Come, then, O Christian, who enjoyest the favor of being an eye-witness of these wonders of God, come and render unto him, in the presence of his creatures, that tribute of thanksgiving which is so justly his due. Shut not thine ears to the voice of his grace; harden not thy heart against the mild invitations of his mercy. Look around thee; every object bespeaks the bounty of thy God. These fields, smiling with abundance; these pastures, studded with flocks and herds; these forests, which afford thee shade and fuel; this sky, which covers and gives thee light; all that thou seest, hearest, smellest, tastest, and feelest, ought to excite thy gratitude and joy. Such are the emotions which should fill thy whole soul, accompany thee in all thy walks, and follow thee into thy retirement. Thou wilt find that no pleasures make a more profound impression upon the heart, that none is more permanent, or better adapted to the nature of man, than the calm delights which the contemplation of Nature affords. The more assiduously thou shalt study the manifold beauties of Nature, the more thou wilt be convinced that the Creator is a God of

love, and that the religion of Christ is a source of unfading joy, and a continual motive of grateful adoration.

## *JULY 7.*

### REFLECTIONS ON A FLOWER-GARDEN.

COME, reader, accompany me to the garden, and contemplate the manifold beauties with which this little spot is covered. The care, skill, and industry of man have made it the enchanting theatre of the choicest flowers. But what would it be without attendance and cultivation? A wilderness, producing nothing but thorns and thistles. Such would be the minds of youth, were not their minds formed and polished by early instruction. But when they are betimes ameliorated by discipline and instruction, they put forth delightful blossoms, and in due season will produce fruit that shall be beneficial to society.

Look at the night-violet, which toward evening perfumes the whole garden with its fragrance, which surpasses that of all the other flowers. It might be denominated the altar of Flora, from which the incense ascends, like a cloud. But it has no beauty. It has scarcely the appearance of a flower; is small, and of a grey color, approaching to green, so as to be scarcely distinguishable from leaves. Modest and unostentatious, it scents the whole garden, though it is not perceived among the multitude. You would scarcely conceive that so diminutive and so insignificant a flower could yield odors so exquisitely sweet. It resembles a person who is not handsome, but whose want

of beauty Nature has compensated by the more estimable qualifications of the mind and heart. The virtuous delight to do good in secret, and diffuse around them the exquisite odor of good works; and when we become acquainted with these beneficent characters, we find, perhaps, that they are not distinguished either by elegance of person or elevation of rank.

The carnation, on the other hand, combines both beauty and fragrance, and is indisputably the most perfect of flowers. It rivals the tulip in its colors, and surpasses it in the number of its leaves and the ingenuity of its structure. A small bed of carnations communicates its perfumes to the whole garden. This flower is the emblem of a man who unites beauty of person to superior mental qualifications, and commands the love and respect of his fellow-creatures.

I now approach the rose. The color, the figure, the smell, in a word, every thing belonging to this flower is calculated to charm us. But it appears to be the most perishable of flowers, as it very soon loses those attractions which distinguish it from so many others—an instructive lesson to all those who are endowed with extraordinary personal beauty, warning them not to be vain of such fleeting advantages.

It is, nevertheless, a melancholy spectacle to behold the ground at this beautiful season, strewed with so many withered blossoms and fallen leaves. But why should I murmur and find fault with Providence because it has not given the flowers perpetual duration? The world is a vast stage, on which the same actors are not destined continually to perform, but those which have finished their

parts retire to make room for others. This is required by the diversity of the works of God; a diversity which contributes to their excellence. If one generation were not to remove from the theatre of life, what would become of all the succeeding ones? We are delighted with variety; and how could it exist unless present objects were to give place to others? The flowers would not afford us such pleasure, if, instead of lasting but a few months, they were to blossom all the year round. Absence renders us solicitous for the return of an object, while its uninterrupted presence is apt to excite satiety and disgust. When the mind has tasted all the delight that an object is capable of conferring, it begins to be indifferent towards it, and to aspire to new pleasures. The manifold changes to which terrestrial things are subject, are therefore a medium which Providence has employed to render human life a scene of continual delight.

Such is the felicity of this world. All is vanity. "All flesh is as grass, and all the glory of man as the flower of grass; the grass withereth, and the flower thereof falleth away." (I. *Peter*, i. 24.) The roses and lilies of a beautiful face fade like the flowers of the garden, and death leaves no trace of them behind. Let us, then, be wise, and seek to derive our felicity from permanent and everlasting sources. Wisdom, virtue, and the advantages of genuine Christianity never fade, but are inexhaustible springs of true gratification and delight.

Of the usual phenomena of thunder-storms.

## *JULY* 8.

### OF THE USUAL PHENOMENA OF THUNDER-STORMS.

NOTWITHSTANDING the tremendous phenomena attending thunder storms, they present a spectacle so majestic and so astonishing, as to be highly worthy of our consideration. An examination into their nature and effects is the more necessary, as an unreasonable fear often prevents us from observing this awful phenomenon with attention.

When a thunder-cloud, which is nothing but a collection of vapors highly electrified, approaches so near a tower or a house, or another cloud, which is either not electrified, or is electrified in a less degree than itself, the electric matter flies off from all parts towards it; and hence proceed flashes of lightning, and the formidable report of thunder. The lightning appears either in the form of one momentary flash, or numbers of flashes are seen at once shooting in zigzag directions. The report which succeeds the lightning demonstrates that, the vapors producing the latter, occasion by their sudden inflammation an extraordinary expansion and agitation of the air. The emission of every electric spark is attended with a report, and thunder is formed on the very same principle, though it may actually be composed of several claps, or be multiplied and prolonged by reverberation. There is generally some interval of time between the lightning and the thunder-clap, and by this circumstance we are enabled to judge, with tolerable accuracy, of the degree of danger, and its distance, or proximity: for sound requires some time before it can reach our ear. The lightning, on the contrary, traverses the same

Of the usual phenomena of thunder-storms.

expanse of atmosphere with infinitely greater velocity. As soon as you perceive the flash, you need only count the seconds, either by a watch or by your pulse. If you count five pulsations between the lightning and the thunder, you may calculate that it is more than a mile distant; sound being transmitted at the rate of about three hundred and eighty yards in a second.

Lightning does not always descend in a right line from the atmosphere to the ground; but often shoots out in a serpentine or zigzag direction, and produces an explosion when very near the earth. The electric matter which reaches the earth, or explodes near it, never fails to strike. Sometimes the ignited matter bursts like an ill-charged bomb before it arrives at the earth, and in this case it is perfectly innocent; at others the lightning is extremely dangerous. But as the proportion of vacant places on the earth far exceeds the space occupied by houses and men, many thousands of flashes may strike it without doing any real mischief.

The course of the lightning is particularly wonderful, and it is impossible to be traced. It depends on the wind, the quantity of exhalations, and other causes; taking undoubtedly that direction in which it meets with inflammable vapors: as when a grain of gunpowder is lighted, the flame runs along the train, setting fire to every thing in its way.

The force of lightning may be estimated from the astonishing effects which it produces. So intense is its flame, that combustible bodies are set on fire and consumed, and metals are melted, even without injury to the substances in which they are

contained, if they are sufficiently porous to allow the electric fluid a free passage through them. To the velocity of lightning it is owing that the bones of men and animals are sometimes shattered, though the flesh receives no injury; that trees, walls, and even rocks are cleft and rent in pieces. The rarefaction and agitation of the air, produced by its intense heat and velocity, occasions the death of men and animals that are often found suffocated, though they have not been struck by the lightning itself.*

Contemplate, O Christian, all these phenomena with due attention. How many wonderful objects are exhibited in a thunder-storm. You perceive a black cloud; but it is the pavilion of the Most High, who is concealed in it. It descends toward the earth; but it is God "who boweth the heavens, and cometh down, with darkness under his feet."

* On the immediate cause of death, under these circumstances, various opinions are entertained by those philosophers who have most attentively investigated the subject. Some have ascribed it to the terror produced by the tremendous report of the thunder, and the sheets of fire with which the unfortunate persons perceived themselves surrounded. Others have attributed the fatal effect to the operation of sulphureous vapors. Others, again, have imagined that the lightning, expelling the air from the space in which it acts, and at the same time depriving it of its elasticity, the animals must then be in a perfect vacuum, and die in the same manner as those placed under the receiver of an air-pump. Whether this phenomenon, however, be the result of any or all of the above causes, it does not appear improbable that by seasonable aid and a due attention to the subject, many persons in whom life appears extinct from the effects of lightning, might be recovered. Might not the philanthropic efforts of the Humane Society be extended with benefit to accidents of this kind? T.

(II. *Samuel*, xxii. 10.) Tempestuous winds arise, driving clouds of dust in every direction; but the Almighty himself "rides on the whirlwind and directs the storm." Before the splendor of his majesty the clouds are parted asunder; the lightning flashes, the thunder roars, and the hail descends. "The sound that goeth out of his mouth he directeth under the whole heaven, and his lightnings unto the end of the earth. After it a voice roareth, he thundereth with the voice of his excellency; great things doth he which we cannot comprehend." (*Job* xxxvii. 2—5.) But, if his awful lightnings sometimes strike terror into his creatures, his bountiful hand is nevertheless extended to distribute among them abundance of food in due season.

## *JULY* 9.

### THE ANTS.

THE ants, like the bees, may be considered as a commonwealth, having a regular government, constitution, and laws. They live in a town, that is divided into streets, all of which lead to distinct magazines. The industry with which they collect materials for constructing their habitations is truly astonishing. They form their retreat. They collect a quantity of grass, straw, sticks, and such like things, with which they form a heap, and apparently without observing the least degree of order; but notwithstanding this seeming confusion, we discover in it considerable art and skill upon a more attentive examination. Beneath the hillocks under which they reside, and which are constructe in such a manner that the water can run off, we find

passages which communicate with each other, and may be considered as the streets of this little city. The care which the ants take of their eggs cannot fail, in particular, to excite admiration. With what solicitude they convey them from place to place; with what tenderness they feed their young, and remove out of the way every thing that might hurt them. They even pay attention to maintain around them the temperature which is best adapted to their growth. Their painful toils in summer to collect provisions, are undertaken principally for the sake of their progeny; for they have themselves no occasion for food during the winter, because they pass that whole season, till the commencement of spring, in a state of insensibility. As soon as the young have crept forth from the egg, they are busily employed in feeding them, which is an extremely troublesome occupation. The ants have commonly several habitations, and convey their young from one to another, which they are desirous of rendering more populous. According as the weather is hot or cold, dry or wet, they remove their larvæ nearer to the surface of the earth, or farther from it. In fair weather they bring them very near the surface, and sometimes even place them in the sunshine after rain, or in the cooling dew after a long drought; but, on the approach of night, rain, or cold, they again take up their offspring in their paws, and carry them so low down into the earth, that you are sometimes obliged to dig to the depth of more than a foot before you reach them.

There are several species of this insect. The wood-ants reside in woods and groves, without doing the slightest injury to the meadows: of these

there are two sorts, one red and the other black. Some chuse for their residence dry places, and prefer such where they find in the earth the relics of pine and birch trees, in the roots of which they construct their habitations. Those of another species inhabit the old stumps of felled trees that project above the surface of the earth, in which they form their dwellings, at such a height as to be out of the reach of its humidity. The cavities of the trunk they convert into chambers, covering them with straw and other materials, to shelter themselves from rain and snow. The same difference of color prevails among the field-ants, but they are smaller than the former. They build their nests, either among corn, or among the grass in meadows. As long as the weather continues dry, they remain at a considerable depth below the surface of the soil; but when it is wet, they raise their habitations more and more, according to the quantity of rain. As this decreases, they again retire to their lower apartments. Some of the ants are furnished with wings, and may be seen in great numbers in autumn, flying over the ditches and other waters.

But are these insects, which commit such devastations in our meadows, worthy of our attention? By their subterraneous labors they excavate the earth, and throw up the soil in such a manner as to injure the herbage.—These and other complaints are made against the ants. They are enemies to bees and silk-worms, and are charged with doing considerable injury to the flowers, and in particular to the young trees. They are said to consume the buds and young shoots, and, insinuating themselves under the bark, to penetrate to the very heart of the tree. Hence these insects are universally per-

secuted and exterminated wherever they are found. If the ants collected honey, even at the expence of myriads of other creatures, they would be held in the highest estimation; but because they destroy, in the construction of their nests, a few plants which might be useful to us, we think ourselves authorized to kill them whenever we can. But, even though these insects are productive of some mischief, are they, on that account, the less deserving of our notice? Are only those animals that render us immediate service worthy of our attention? O! no, my brethren, let us relinquish this prejudice. Even the ants are capable of affording us instruction and amusement. Their conformation, their incessant industry, the economy of their commonwealth, their tender care of their young, and perhaps many other qualities which we have not yet discovered, are calculated to convince us of the wisdom of that Being, who is their Creator as well as ours. For, my brethren, of all the works which God hath made, there is none but what is good and excellent, and worthy of admiration, however useless or pernicious it may appear.

The supreme Creator, who hath given life and breath to every being, formed nothing without design, nothing but what has its use and destination. Not a single leaf upon our trees, not a blade of grass in our fields, not a blossom of our flowers, nor even the smallest mite that exists, hath he created in vain. This important truth, ye despised and persecuted insects, will I learn of you. Thus I shall never contemplate an ant-hill without going away from it both wiser and better.*

* To the brief account of the ant given by the author, I

Of hail.

## JULY 10.

### OF HAIL.

HAIL is nothing but congealed drops of rain, of a spherical, oblong, or angular form. To some it

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shall take the liberty of subjoining a few of the most interesting particulars which he has omitted to notice, respecting the natural history of that insect.

The common ants are divided, like the bees, into three classes; males or drones, females, and laborers, which are of neither sex. The two former have wings, but the latter are destitute of those appendages. The females lay eggs, which are so small as to be almost imperceptible. In a few days a worm issues from them, and grows with great rapidity till it becomes considerably larger than the ants themselves. These larvæ, or grubs, being without legs, and of an oblong form, are commonly, but erroneously called eggs. In a short time they change into aureliæ, and the latter into perfect ants.

After the females are fecundated, and have deposited their eggs, most of them perish, together with all the males. As the working ants pass the winter in a torpid state, this alone is sufficient to disprove the vulgar idea that they employ the summer in collecting a hoard for their subsistence during the inclement season. On the contrary, all the food which they convey to their habitation is immediately consumed.

Another mistaken notion relative to these insects is, that they are injurious to trees. The mischief ascribed to them is actually committed by the aphis, which discharges a saccharine fluid upon the leaves. Of this the ants are extremely fond; and accordingly, wherever the aphis is found, there also the ants are observed in great numbers. So far from being pernicious, it is now well known that they may be rendered instrumental in clearing the trees of caterpillars. This is done in some places by hanging a pouch, filled with ants, upon a tree, the foot of which has been besmeared with wet clay or soft pitch. A hole is made in

Of hail.

may, perhaps, appear paradoxical that vapors should freeze in the atmosphere precisely in the warmest season of the year: but it should be considered that, even during the most intense heat, the upper regions of the atmosphere are extremely cold; otherwise, how could the highest mountains remain covered with snow during the whole summer? Even in the sultry regions of America it is so cold on the summits of the loftiest mountains, that you are in continual danger of being frozen to death. The cold in the upper regions of the atmosphere being so intense, we should have snow in summer, were it not melted before it reaches the earth. These particles of snow uniting, begin to congeal, and as, during their descent, they suddenly pass through warmer regions of air, their cold increases to such a degree before this change of temperature has time to operate, that they are completely frozen. The reader may perhaps conceive that the cold of these descending drops ought to be diminished in proportion as they approach nearer to our warmer atmosphere; but in winter, when you

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the pouch to permit the insects to escape, when, unable to pass the barrier, they are confined to the tree, and are compelled by hunger to attack and devour the caterpillars which are upon it. Ants, and especially the larger species, residing principally in the woods, exhale a powerful acid, denominated by modern chemists formic acid, and which is a compound of the malic and acetic. The utility of these little insects in the general economy of Nature may perhaps be much more extensive than would at first sight appear. Is it not possible that the acid effluvia continually exhaling from them during the heats of summer, may be one of the means employed by the Creator for preserving the salubrity of the atmosphere? T.

remove cold water which has stood in the open air into a warm room, what is the consequence? It congeals, and becomes ice, which would not have been the case, if it had been taken into a cold room. Precisely the same effect may be observed with regard to falling hail-stones. When these cold bodies suddenly pass through a warmer atmosphere, but with such rapidity that the warmth has not time to penetrate them, their cold is increased to such a degree that they are converted into ice. To this end contribute also the subtle and volatile saline particles with which the atmosphere more or less abounds. We need not, therefore, be surprized that thunder-storms are not always accompanied with hail; for, in order to produce hail, a certain quantity of saline vapors is necessary to cause the drops of water to freeze more instantaneously. Though hail is most frequent in summer, it falls also in the other seasons; for, as certain fermentations of the saline vapors may at any time take place in the atmosphere, hail may fall in winter, spring, or autumn. The form and size of hail are not always alike. It is sometimes round, sometimes oblong and sharp pointed, and at others flat and concave. Its usual size is that of small shot; the stones are seldom so large as nuts, though they are said to have sometimes fallen of the dimensions of a goose's egg. The precise form and size of hail may depend on many accidental causes. Among these, the principal are the winds, especially when they blow with violence from contrary quarters at the same time. It is likewise possible that in their fall the hail-stones may be continually receiving accessions of aqueous vapors, or

that several freezing drops may unite and be congealed together.

Hail, it is true, when of a large size, does inconceivable mischief to houses, animals, and the produce of the earth: but this by no means authorizes us to regard it as a judgment or punishment of God. If its violence sometimes lays waste a few fields, and breaks some hundreds of windows, this damage, great as we may think it, is a mere trifle in comparison of the obvious advantages which it produces.* Hail moderates the heat in summer, by the cold which it diffuses through the lower regions of the atmosphere; and, dissolving,

* We have great reason to congratulate ourselves on our almost total exemption from the calamities which hail occasions in other regions of the globe. In France its ravages are particularly felt. There the husbandman frequently has the mortification to behold the labors of one half of the year, and the hopes of the other, frustrated and blasted in the space of very few minutes. We read of hail in that country, the stones of which have each weighed one, two, nay, even so much as eight pounds. The destructive effect of such storms on the vegetable and animal kingdoms may be easily conceived. The ingenuity of man has, however, discovered a method of dissipating, on their approach, the clouds from which they proceed, and thus preventing the ravages occasioned by them. This is effected by means of cannon, which are placed on eminences, and discharged before the stormy clouds have had time to accumulate in great number; and the explosions are repeated till they are totally dispersed. This method is said to be invariably attended with the happiest results. It was first practised about thirty-five years ago by the Marquis de Chevriers, at his estate at Vaurenard, in the department of Saône and Loire, and it is now employed, with uniform success, by the inhabitants of the adjacent country to a considerable extent. T.

it contributes to the fertility of the earth. It is exceedingly remarkable that though all meteors seem to succeed each other without any regularity, and are different in one year from what they were in the preceding, yet this apparent confusion is productive of incessant fecundity.

In this also, O adorable Creator, dost thou manifest thy wisdom and goodness; even in the midst of hail-storms will I praise thee, for thy hand doth great things, and giveth us bread in abundance!

## *JULY* 11.

### UTILITY OF THUNDER-STORMS.

**It is a duty which cannot fail to appear the more essential to every attentive observer of the works of God, the more it is neglected by the thoughtless, the ignorant, and the ungrateful, to consider all the phenomena of Nature in that point of view, in which the goodness and wisdom of our heavenly Father are rendered conspicuous to the understanding, and are deeply impressed upon our hearts. It cannot, indeed, be denied that God sometimes makes use of natural phenomena to punish the sins of men; but these individual instances nevertheless tend to the general benefit of the whole, which is the primary object of the Almighty. All Nature furnishes incontestible demonstrations of this truth. We shall now confine our attention to one of these phenomena, which is particularly calculated to instruct, and on which subject we want instruction, perhaps more than on any other.**

The greater part of mankind are accustomed from infancy to pronounce the words thunder and

lightning with fear and trembling. Such is our absurdity that we think only of the very small number of instances in which storms are injurious to an extremely small portion of the whole; while we shut our eyes to the numerous and extensive benefits which in every case are conferred by them on mankind, and the universe in general. How different would be our language, if God, indignant at our murmurs and our ingratitude, were to withdraw from us the advantages resulting from thunder-storms.

We are not able, it is true, to enumerate all the benefits we derive from these phenomena; but the little we know concerning them is sufficient to fill our hearts with gratitude toward our great benefactor. Figure to yourself, my dear reader, an atmosphere charged with noxious and pestilential exhalations, which are continually receiving accessions from the effluvia of innumerable putrid and poisonous substances on the earth. This air we are under the necessity of breathing; upon it depends the preservation or extinction of life, according to the salubrity or insalubrity of its constituent principles. When oppressed by the sultry heat of summer, have you not felt a relaxation of all your energies, a difficulty of respiration, and a dejection of spirits? Ought you not then to consider it an important blessing, and deserving of your warmest gratitude, that a salutary storm arises to purify the air of its noxious principles, to consume the saline and sulphureous particles, and thus prevent their pernicious effects; to cool the atmosphere, and, by restoring its elasticity, to facilitate respiration? If these beneficial effects were not produced by storms, the noxious matter

in the air would be continually accumulating; men and animals would perish by thousands, and a universal pestilence would soon transform the world into one vast cemetery. Which, then, is the most rational, to rejoice or to repine at thunder-storms? to murmur at the trifling mischiefs which they sometimes occasion, or to thank and adore the Almighty for the blessings which, upon the whole, they confer on the earth? Add to this, that men and animals not only derive important advantages from the purification of the atmosphere from accumulated vapors by means of thunder-storms, but that it is also highly beneficial to the vegetable kingdom. Experience teaches us that the rain which falls during a thunder-storm is far more favorable to vegetation than any other. The saline and sulphureous particles with which the air is impregnated on such occasions, are carried down by the rain to the earth, and convey a most excellent nourishment to plants; to say nothing of the innumerable multitudes of pernicious insects which are swept away and destroyed.

These considerations may tend to moderate our excessive fear of thunder-storms; a fear which too plainly evinces the little confidence we place in God. Instead of cherishing fearful and terrific ideas, let us habituate ourselves to contemplate the grandeur and sublimity of an approaching thunder-storm. Instead of dwelling only upon the accidents occasioned by lightning, let us reflect on the necessity and great utility of this phenomenon. Instead of praying to the Almighty to avert storms, let us wish for them, or rather, let us leave the direction of all these things to him who governs the universe with supreme wisdom and goodness.

Whenever the storm shall lour, let us, with full conviction of heart, exclaim: 'Tis thou, O omnipotent, who commandest the thunder, and directest the winged lightning in its course. Our fate is in thy hand; thou canst preserve, and thou canst destroy. Thy storms can either fertilize or desolate our fields. Great art thou, O Lord our God, and ineffable is thy power. How can we withstand thee, or whither can we flee from the visitation of thy wrath? But are we not thy children, and art not thou our reconciled Father? Thou speakest to us in thunder, not to curse, but to bless us. Praised be thy name, O Lord, from everlasting to everlasting; and let all the people say: Hallelujah! Amen!

## *JULY* 12.

### OBSERVATIONS ON THE EARTH AND ITS PRIMITIVE CONSTITUTION.

GOD has so constituted the earth that it is adapted to the production and support of herbs, plants, and trees. It is so compact that the vegetables growing in it cannot be blown down by the wind, and at the same time so loose and light that the roots can shoot forth in it, and attract humidity and nutritive juices. Even when the surface of the earth is parched with drought, the lightness of the soil still makes the humidity to ascend as through capillary vessels, that the trees may not be deprived of the requisite nourishment. The earth is moreover impregnated with various kinds of oleaginous and other juices, which promote the growth of plants; and that the different species of ve-

getables may be perpetuated, God has created many different kinds of earth, with a view also to other purposes. One sort is used to make bricks and tiles for building; another in the manufacture of various kinds of vessels and household utensils; this in dyeing, and that in medicine.

The inequalities of the earth's surface are productive of great and general benefit. Mountains afford a retreat and abode, not only to a greater number, but also a greater variety of animals and vegetables. They serve to break the violence of the winds, and produce herbs and fruits which will not thrive in the plains. They are the magazines in which Nature has deposited the metals and minerals for our use. They are the reservoirs whence the earth is supplied with water, since most of the rivers take their rise in mountains, partly from the melting of the snow, partly from rain, and partly from other vapors. Of the stones extracted from the bosom of the earth, some are used for building houses and walls, and others for making lime and glass. The metals render us such a variety of services that it is impossible to enumerate them all. Consider only the tools of our mechanics and artisans, the multifarious household utensils which are manufactured from them, and are subservient either to our pleasures or our necessities. From the solidity and gravity of these bodies we often derive considerable advantages. The utility of minerals is scarcely less extensive. The salts serve to season our food and to preserve it from putridity, and the sulphureous particles in bodies render them combustible.

Even earthquakes and volcanoes, whatever calamities they may sometimes occasion, are, never-

theless, indispensably necessary, and of general utility. If the sulphureous vapors were not consumed by the subterraneous fire, they would ascend in much greater quantity into the atmosphere, and render it unwholesome; many warm baths would cease to exist, and many metals and minerals would no longer be produced. Our ignorance alone prevents us from discovering the utility of an infinite number of objects. In the contemplation of certain phenomena of Nature, which are occasionally prejudicial to man, we ought always to bear in mind this maxim, that if God sometimes permits trivial evils to occur, it is only that they may contribute to the perfection of the whole. We ought, therefore, to consider the works of God, not only in one point of view, but to survey them on every side, and to explore their whole concatenation, if we would convince ourselves of the wisdom with which they are constituted and arranged.

We consider many things as prejudicial which are of incontestible utility, and others as superfluous, though there would be a chasm in the empire of the creation if they did not exist. How many objects appear of little value because we are unacquainted with their real uses. Put a magnet into the hands of a person ignorant of its properties, he will think it scarcely worth looking at; but tell him that to this stone we are indebted for important improvements in navigation, and the discovery of a new world, and he will begin to entertain a different opinion of this production. The same observation is applicable to thousands of objects which we disregard or undervalue, merely because we are unacquainted with their ends, their uses, and relations in the general system of Nature.

Of the changes of the moon.

O Lord, the earth is full of thy blessings. All that is over or under the earth, the very dust not excepted, has been wisely constituted by thee. How long have I myself dwelt upon the earth, and witnessed thy beneficence. Grant that I may consider it as a sacred duty to improve myself in the knowledge of thee, and to love thee more and more fervently for all the blessings which, by means of the earth, thou bestowest upon me.

## JULY 13.

### OF THE CHANGES OF THE MOON.

Observation teaches us that the moon has a peculiar motion round the earth from west to east; for, after she has been placed between the earth and the sun, she retires from that luminary, and recedes towards the east, changing her place of rising every day, till, at length, in a fortnight she is exactly at the opposite point of the horizon to the sun when he sets. She is then said to be in opposition, rising in the evening at sun-set, and setting about the time when the sun makes his appearance. In continuing her course round the earth, the moon again removes from the point of opposition, and keeps gradually approaching towards the sun. She now makes her appearance later and later, and at last is visible only a little before the sun. This revolution of the moon round the earth explains the reason why the moon rises and sets at such different times, and why her phases are so different, and yet so regular.

Every one must know that a candle or any other light can illumine only half the surface of a globe,

and that the other half must necessarily remain in the dark. With the naked eye we may perceive that the moon is a sphere which receives its light from the sun. When she is, therefore, nearly in a direct line between the earth and the sun, her enlightened half is turned towards that luminary, and the dark half towards the earth; consequently, at such times she is invisible to us. She then rises and sets at the same time with the sun, and in the same point of the horizon. This is what we denominate new moon.

When the moon, pursuing her course, gradually retires from the sun, and passes back toward the east, her dark side is not entirely turned to the earth. We begin to perceive a small portion of her enlightened side, a narrow stripe in the form of a sickle. This luminous crescent we perceive to the right, immediately after sun-set, or even before, at the opposite point of the horizon. The two points, or horns, are toward the east. The farther the moon recedes from the sun, so much the more the visible portion of her illumined surface increases. At length, at the end of seven days, when the moon has accomplished one fourth of her revolution round the earth, we perceive one half of her surface enlightened. The luminous portion is then turned toward the sun, and the dark part reflects no light upon the earth. Now the luminous part of the moon constitutes only one moiety of the whole sphere; the half of this portion is consequently but a fourth part of the lunar globe. Hence the moon, when in this state, is said to be in her first quarter.

The farther the moon retires from the sun, and the more her course again approaches to a right

line, the more her light increases, and the more we can discover of her illumined half. In seven days after she has completed her first quarter, she is nearly in opposition with the sun; and in this position, her whole hemisphere illumined by the sun is visible to the earth. She then rises in the east exactly at the moment when the sun sets in the west, and this is called the full moon.

The day after the full moon, the enlightened half is turned a little from us, and we can no longer see the whole of it. The light gradually leaves the western side, and is communicated to the other half which is turned from the earth. The farther the moon proceeds in her course, the larger becomes her dark portion, till at length she turns one half of her dark side, and consequently one half of her luminous side toward the earth. This appearance of the moon is denominated her last quarter.

Let us, my dear reader, adore the wisdom and the goodness of the Creator, whose glory is displayed to the earth in the various changes of the moon. From the admirable harmony which exists between the revolution of the moon round her axis, and her course round the earth, it happens that the moon presents to us the same side which she has shewn ever since the creation. During so many ages the moon has, with invariable accuracy, completed her revolution in twenty-seven days and eight hours. With the utmost regularity she has at certain periods enlightened at one time our nights, and at another those of distant regions. With what tender solicitude hath the divine wisdom provided for the comfort of mankind, assigning to the earth a companion in the moon, which illumines our nights during almost half the year. How,

far, alas, we estimate this dispensation of the Creator below its real value! But let us remember that there are people who more highly appreciate the benefit of moon-light, and cannot live without its influence. They are, doubtless, more grateful for this gift of heaven than we in general are.

The continual changes of the moon, both in her appearance and in her course, are a lively emblem of the vicissitudes to which all terrestrial things are incessantly subject. At one moment health, joy, and affluence, with a thousand other advantages, diffuse around us a brilliant light. In a few days its splendor disappears, and we have nothing left but the mournful recollection of departed pleasures. What abundant reason have we to desire to depart from this inconstant world, and to pray for our removal to that blissful region, where we shall rejoice so much the more in our felicity, because thenceforward it will not be liable to change.

## *JULY* 14.

### OF MINERAL WATERS.

WHETHER we consider mineral waters with respect to their formation, or their utility to man, they cannot but be regarded as valuable gifts of the goodness of God: but this, like many other blessings, we are too apt to pass over with neglect and ingratitude. Even those very places where life and health flow for us in copious streams, are seldom what they ought, by right, to be, theatres of praise and thanksgiving to the dispenser of all good. Let us, my brethren, be henceforth more grate-

ful for the bounty and loving-kindness of our heavenly benefactor.

The salt springs, from which our common salt is prepared, are richly deserving of our attention. It is probable that they owe their origin to the mineral salt which the waters dissolve in the earth. The hot springs and baths are not less remarkable. They are not only so numerous, that Germany contains upwards of one hundred and twenty, but likewise so hot, that the water must be left twelve, or even eighteen hours, to cool, before it is fit for bathing. What can be the cause of this excessive heat? Not the sun, otherwise all these waters, without exception, would necessarily be hot as long as they were exposed to the heat of the sun, and they would become cool after the setting of that luminary, and also in winter. Neither can this heat be ascribed to subterraneous fire, for even then the question whence these baths derive their medicinal properties, would still remain to be answered. The most natural way of accounting for it is, that these waters pass through soils containing sulphur and pyrites, and hence acquire such a high degree of heat. When the water comes in contact with the pyrites, it dissolves the sulphureous and ferrugineous particles, which become heated by the fermentation and reaction of their principles, and communicate the same degree of temperature to the water in its passage.

Medicinal waters, and particularly those which are acidulous, are produced by the dissolution and mixture of mineral substances. They are generally found in places containing iron, sulphur, or coal; hence their taste and effect are widely dif-

ferent, according as they are more or less impregnated with those substances. These springs are bitter when they pass through bitter roots, bitumen, nitre, or copper ore. They are cold when the water is mixed with sal ammoniac, nitre, alum, or when it issues from the bed of a rock. They are rendered oily by bituminous substances; and sulphureous by sulphur combined with an acid.

Admire with me, my dear reader, the inexhaustible source of the divine mercy, which pours forth upon mankind never-failing streams. I will not deny that mineral waters may answer many other different purposes, but it is incontestible that they were all produced for the preservation and the health of man. For thee, O mortal, the Lord causeth springs to arise. You, in particular, my brethren, who experience the healing and invigorating virtues of these waters, let your hearts expand with joy and gratitude to your heavenly Father; honor him by imitating his example, and let the gifts which he has bestowed upon you be sources of life and consolation to your needy and afflicted fellow-creatures.

## *JULY* 15.

### CONTINUAL ACTIVITY OF NATURE IN THE VEGETABLE KINGDOM.

If we would discover the reason why Nature is incessantly employed throughout the year, we need only consider the numberless advantages resulting from this continual activity. The vegetableking-dom is destined for the use both of man an animals, affording the former food and recreation, and

the latter nourishment alone. In this consists the whole mystery. The beneficent Creator, willing that Nature should conduce both to the pleasure and support of man, commanded her not to bring forth all her productions at once, but in regular succession: for, in the former case, none of the above-mentioned ends could have been answered. How could men find time to gather their harvests, if all the fruits were to attain maturity at one and the same time? How could they preserve them, especially since many of them would very soon become unfit for use? What then would become of those qualities which delight our senses? How would cherries and other summer fruits taste amid snow and frost? Would not our wine turn to vinegar, if the grapes whence this beverage is extracted were to ripen during the heats of summer? What would become of those myriads of animals who are objects of the benevolent care of the Creator as well as we? How could they live, if all the fruits were to arrive at maturity at once? Many hundred species of insects subsist only upon flowers; where would they find subsistence, if these lasted but a month or two? Could they in that time collect stores sufficient for their support throughout the remainder of the year? Most of the insects, indeed, have no food during the winter; but they are so constituted that in the season when Nature affords them no supply, they fall into a profound lethargy, in which state they have no occasion for nourishment. In summer they must be provided for, because they are then awakened by the heat. It is, therefore, certain that, were Nature arranged in a different manner, both men and animals would suffer want, or even perish with hunger. We have, then, abun-

dant reason to conclude that the support of men and animals is one of the principal reasons why the Creator hath caused Nature to operate with such incessant activity in the vegetable kingdom.

If we reflect on the gratification of the organs of sight and smell, which God designed to afford mankind in the works of Nature, we shall perceive the absolute necessity of the present arrangement. It was requisite that she should not only display all her flowers in their greatest beauty, but that she should produce a continual succession, that man might enjoy this pleasure, not for a short interval, but for a very long period. In spring, when he walks forth to view the different productions that she is preparing for our future nourishment, he beholds the blossoms of the trees unfolding all their beauty and magnificence. In summer, when the growing corn principally attracts his attention, a thousand charming flowers delight his eye. One generation succeeds another, as long as man can enjoy the pleasing spectacle. At length, when inclement winter arrives to confine us within our habitations, Nature produces other vegetables, which, though less striking to the eye, are nevertheless of manifold utility. Hence it appears that the pleasure and gratification of man are one of the reasons why God has arranged and constituted Nature in the manner we have already observed.

This, then, is the law, according to which God has regulated the vegetable kingdom. His object was, that men and animals should find an abundant subsistence, and that the former should, moreover, enjoy as much pleasure and gratification as possible. Agreeably to this law, some plants flower

and bear fruit in spring, others in summer, and others in autumn and winter: each has its appointed time, and appears at the very moment when it is of the greatest service. As one decays and perishes, another appears in blooming beauty. Many thousands of plants present themselves to our view, and all of them are obedient to the same law.

Such is the wise order established among all the works of the Creator, though to us short-sighted mortals many things appear unseasonable, and others without either end or utility. Let us then praise the Lord for every ordination of his wisdom, and never behold the manifold revolutions which take place in the vegetable kingdom without bearing in mind that they were intended to conduce to our advantage and pleasure. How will our hearts then expand with gratitude to our bountiful Father, and with what transport will they be filled when we walk abroad in our gardens or in the fields to contemplate the beauties of Nature!

## *JULY* 16.

### BEAUTY AND UTILITY OF MEADOWS.

THE sight of a beautiful and extensive garden affords us in this season an exquisite gratification, which those who remain shut up in their apartments cannot enjoy, and of which, indeed, they can form no conception: but the pleasure derived from a garden laid out and cultivated by the most skilful hand, is not to be compared with that which we receive from our walks in the meadows and fields. The proud tulip, the waving narcissus, and the blue hyacinth are less pleasing to me than the

simple flowers which modestly raise their heads in their native fields. With whatever charms the flowers cultivated in our gardens may be adorned, still I give the preference to those of our meadows. The former are beautiful; the latter combine utility with beauty; and the pleasure received from beauty, without utility, is of very short duration. Is it not the case, my dear reader, that in the long, uniform gravel walks, within these walls and these enclosures, we sometimes feel a confinement and restraint that are irksome and oppressive? We sigh for the wide, unobstructed range of the fields; we long to rove there in the full enjoyment of liberty; we want more space and more variety. The aspect of Nature, rich, beauteous, and fruitful Nature, varies at every step during this season of the year; but in the embellishments of our gardens we discover an insipid sameness and uniformity. Their very order and regularity soon diminish the pleasure we at first received from them; and when they no longer have any thing new to offer, the eye becomes weary of beholding the same objects. How delightful, on the contrary, is the incessant variety of the meadows and fields! With this continual change of objects and the expansive prospect the eye can never be cloyed. To heighten our pleasure, Nature has not made the earth perfectly level, but has diversified its surface with gently swelling eminences and delightful hills. She has done still more; she has relieved us from the trouble of cultivating and watering these flowery gardens. She distributes over them a prodigious quantity of seeds, by means of which she produces a perpetual verdure, or if it chance to be here and there interrupted, she soon restores it to its pristine beauty.

Beauty and utility of meadows.

The wonderful variety of plants which cover our meadows is not, however, designed merely for shew. Each has leaves and blossoms, beauties and properties peculiar to itself. In every field we find, it is true, innumerable multitudes of the same species of plants, but we cannot take two steps without trampling on, perhaps, a hundred different kinds of grasses, each having a peculiar structure and a different use. With the pleasure which the aspect of the meadows affords the eye, our bountiful Creator hath combined the most important advantages. For us they produce plants, some of which serve us for food, and others for medicine. But the principal benefit we derive from the fields is this, that they support, with scarcely any expence, the animals which are most serviceable to us. The ox, which, after a life of labor, furnishes us with a substantial and nutritious aliment, requires nothing but grass for his subsistence. The horse, whose services are so multifarious, desires no other recompense than the liberty of bounding over the pastures, or a supply of hay for his manger. The cow, whose milk is so useful for various purposes of domestic economy, is satisfied with the same kind of fodder. Meadows and pastures are most profitable to the husbandman, and are preferable even to the cultivation of corn, for their produce is always certain; they want neither ploughing nor sowing, but only require the little trouble attendant on the gathering of their crop, which is not casual or precarious, for it is very rarely indeed that our meadows are laid waste either by drought or by inundations.

It is, nevertheless, painful to observe the inattention of mankind with respect also to this blessing.

We too commonly behold the meadows and the grass springing up in them with indifference; perhaps because we think that we derive no immediate advantage from their produce; perhaps because the Almighty hath caused the grass to grow spontaneously beneath our feet, without requiring any cultivation or attendance. But our indifference, let it proceed from whatever cause it may, is not the less inexcusable. O let us then in our walks through the meads and pastures, carry with us in our bosoms a tender and a grateful heart! May the sight of the grass and of the flowers deeply impress us with the bounty of the Most High, who openeth his hand, and showereth abundance upon men and animals. May we feel a thorough conviction that the goodness of our God is every where displayed, and that there is not a corner of the earth in which he has not manifested traces of his tender Providence. Yes, my brethren, every soil, whether fruitful or barren, sandy or marshy, stony or humid, from the banks of the river to the summit of the mountain, announces the loving-kindness of our God. The whole earth is but one vast meadow, in which abundance and joy are dispensed to man, and to every other living creature.

O my gracious God and Creator, let me not then behold the meadows without sensations of the most profound gratitude! Seated on the verdant turf, I will gaze around in extacy, and then raise my eyes to thee, O my tender and bountiful Father! How charming are the flowers, whose opening beauties meet my view every where around me. Not more delightful were those which Adam beheld in the bowers of Eden. Here thousands of feathered songsters celebrate in melodious strains the Sove-

reign of the universe; yonder the enamelled verdure of the meads, the forests and the groves, all, O Father of Nature, announce thy bounty and proclaim thy praise!

## *JULY* 17.

### THE MORNING DAWN, OR TWILIGHT.

It cannot be doubted that this phenomenon of Nature, which daily presents itself to our view, is, like all others, conducive to the benefit of the world. The dawn is only a precursor of day, by which our eyes are accustomed to endure the brightness of the sun's rays; but it is not uniformly the same at all seasons or in all climates. Towards the poles it is of longer duration than in the tropical regions. The inhabitants of the torrid zone see the sun rise in a right line above their horizon, and sink below it in the same direction. Hence it happens that they are suddenly involved in the obscurity of night; on the other hand, when the sun rises and sets nearer to the poles, and does not descend far below the horizon, the nights are almost always preceded and followed by twilight, and, notwithstanding their length, are in some degree luminous. For the former it is an advantage that they have scarcely any twilight, and to the others it is equally a benefit that they enjoy an almost perpetual dawn.

As for us, who are placed at nearly an equal distance from these two extremes, we distinctly perceive that our twilight decreases and increases with our day. We have day-light an hour, and sometimes even longer, after the setting of the sun; and a dawn of equal length precedes his appearance

above the horizon. For this useful arrangement we are indebted to the properties which God has imparted to the air. He has surrounded the globe with an atmosphere, which extends to a considerable height. He has established such a relation between this atmosphere and the light, that when the latter falls perpendicularly upon the air, it is not diverted from that direction: but if a ray of light enters obliquely, instead of passing in a right line through the atmosphere, it is refracted or turned aside in such a manner that most of the rays which fall in this direction upon the atmosphere are reflected upon the earth by means of this refraction. Instead of pursuing their oblique course through the air, they are repelled by it towards the earth. When, therefore, the sun approaches our horizon, many of his rays penetrate the atmosphere by which we are surrounded in an oblique direction. There they are refracted and rendered visible to us, so that we are consequently enabled to see long before the sun makes his appearance.

This law of the refraction of light in the atmosphere which surrounds us, is an ordination in which not only the wisdom, but also the goodness of our God to all the nations of the earth is strikingly manifested. To the inhabitants of the frigid zones, in particular, it is an important benefit, for without the blessing of twilight they would be involved for months in dreary darkness.*

* This bountiful provision of Nature in behalf of the inhabitants of the polar regions, cannot fail to appear the more striking, when the extraordinary effects of refraction in those climates is considered. The Dutch navigator, Barents, who, with some of his countrymen, wintered in

The morning-dawn, or twilight.

To some of my readers this explanation of the cause of twilight may not, perhaps, be perfectly intelligible. Leaving to philosophers a more minute investigation of this phenomenon, let us consider it only as rational beings and as Christians. This may be done by persons even of the meanest capacity, if they only possess an upright heart, ardently desirous to promote the glory of God. To thee, then, honest, though illiterate Christian, I now address myself. Perhaps thou art wiser than many philosophers, who in their investigation and explanation of twilight, forget the Creator, who giveth day-light to man, and produceth all the modifications to which it is subject. Perhaps at the dawn and at the close of day thou fallest on thy knees and adorest thy Creator: "Great author of twilight, I praise thee with the first and the last beams of thine image, the sun. With what tender solicitude hast thou provided for the welfare of thy creatures! Were I a husbandman, who, after enduring the heat of the day, is engaged during the feeble glimmer of night in cutting the ripened grain, my praise would perhaps be still more fervent. Were I a traveller, with what joy should I hail the morning's dawn! Perhaps I should then thank thee beneath the extended canopy of heaven; whereas, at present, I scarcely notice this blessing, or at least, never think of adoring thee for it. How cool and how delightful is the summer's morning! Were there no sun, no atmosphere, didst thou not exist, O Creator of light and

Nova Zembla, in latitude 75 degrees, was agreeably surprized with a sight of the sun seventeen days before he expected him. T.

air, I should not wish to live. Without thee, indeed, how could I possibly be an inhabitant of the earth! Praise be to thee for my existence, and for having placed me in a world which thou hast decorated with so many beauties!"

## *JULY* 18.

### RURAL PLEASURES.

COME and enjoy pleasures which are tasted only by the wise. The first soft rays of the rising sun invite you to the field, where pure joys await you in yon flowery valley, while we chant a hymn of praise to our Creator.

How the breath of zephyr gently agitates each branch, every leaf of these bushes. Every creature we see, leaps, bounds, frisks, or attunes its voice to strains of joy: all Nature appears animated with new life.

Ye umbrageous woods, ye vallies, and ye mountains, whom summer clothes with its gifts, your aspect conveys delight both to the senses and the heart. Your charms owe nothing to art, and far surpass all the beauties of the garden.

The ripening grain will soon invite the sickle of the reaper. The trees, crowned with foliage, overshadow the hills and the plains. The birds rejoice in their existence; they sing their pleasures; and their melodious notes are expressive only of their joys or their loves.

Each year renews the treasures of the peaceful husbandman; liberty, and a sense of his happiness lighten his serene countenance. Nor odious calumny, nor pride, nor gloomy care, to which the

inhabitant of cities is a slave, ever disturb his peace of mind in the morning, or oppress him like a burden at night.

No engagement can prevent the wise, who love to exercise their senses and their reason, from repairing to the country to enjoy the pleasures that are to be found in the bosom of Nature. There rich pastures, meadows covered with dew, and the smiling scenery which she every where presents, fill his soul with delicious joy, and elevate it toward his Creator.

## *JULY* 18. *

### EVENING TWILIGHT.

THE evening twilight is that faint light which illumines our atmosphere, particularly in the west, for some time after the setting of the sun. It is occasioned partly by the refraction and reflection of the sun's rays in our atmosphere, and partly by the atmosphere of the sun himself, which is known by the name of the zodiacal light, and sometimes appears in spring, particularly in the evening, and in autumn in the morning.*

* The zodiacal light was first discovered by Cassini, in 1683. It is somewhat like the milky-way, the tail of a comet, or a faint twilight, thin enough to let the stars be seen through it, and surrounds the sun in the form of a lens. This light is weakest in the morning, and strongest at night; disappearing in full moon-light, or in strong twilight, and is therefore not visible at midsummer in places so near the poles as to have twilight all the night long, but it may be seen there in winter both morning and evening, as it may in places both under and near the equator all the

Evening twilight.

The length of the evening twilight is in general about two hours; but the state of the atmosphere, as well as the apparent course of the sun, frequently cause a considerable variation. In the island of Senegal, where the days and nights are nearly of equal length, the twilight continues only a few moments. The space between sun-set and the darkness of night is scarcely a quarter of an hour. When, therefore, the sun has descended ten or fifteen degrees below the horizon, the whole country is involved in darkness equal to that of midnight. In our climate the shortest twilight takes place on the first of March and the eleventh of October. The unequal duration of twilight is principally occasioned by the relative position of the equator and the horizon. When the northern declination of the sun from the equator in summer, is greater than the north latitude of a place, after deducting eighteen degrees, the sun, even at midnight, does not descend eighteen degrees below the horizon, and consequently the twilight must continue all night. This is the case in all countries under the same parallel of latitude with England, from the nineteenth of May to the twenty-fourth of July.

The advantages which we and many other creatures derive from the twilight, may easily be conceived. To be plunged instantaneously from the light of day into the blackest night, would certainly be attended with great inconveniencies. Such

year round. In north latitudes it is most conspicuous after the evening twilight about the end of February, and before the morning twilight in the middle of October; for at those times it stands most erect above the horizon, and is therefore clearest from the thick vapors of twilight. T.

sudden transitions from light to darkness, and from darkness to light, would soon do irreparable injury to the eyes of animals. Many a traveller, overtaken by night, would lose his way, and most of the birds would be in danger of perishing. All these evils the wise author of Nature prevented by surrounding our earth with an atmosphere, which occasions us to enjoy the benefit of a faint light, even after the sun has sunk below the horizon, and introduces the alternate change of day and night by the regular and gradual progression of the morning dawn and evening twilight.

## *JULY* 19.

### OF THE EPHEMERON.

THIS insect is called ephemeron on account of the short duration of its existence in the state of a fly. It is one of the most beautiful species of small flies, and undergoes five changes or metamorphoses. At first the egg contains its vital principle; from the egg issues a grub, which is transformed into a chrysalis, then into an aurelia, and lastly into a fly. When this fly has deposited her eggs, they remain some time in the water till they are hatched by the heat of the sun, and each of them produces a very small red worm or grub, which creeps like a serpent. In this state it is found in summer in ponds or pools; but as soon as the water begins to be cold, this insect forms for itself a shell or receptacle, in which it passes the whole winter. At the end of that season it ceases to be a worm, and enters into its third state, being transformed into a chrysalis. In this state it continues torpid till spring,

and is gradually changed into a beautiful nymph or aurelia, somewhat resembling a fish. On the day when the aurelia is about to undergo its metamorphosis, it seems inactive and torpid. In the space of five hours the head of the fly makes its appearance, and gradually rises above the surface of the water. The body then slowly disengages itself, till at length the whole insect has crept out of the shell of the aurelia. The new-born fly drops into the water, where it remains some minutes without motion. By degrees it begins feebly to shake its wings, and to exhibit signs of animation. It flutters, attempts to walk, and then to fly. As great numbers of them are hatched at once, they are seen in swarms, dancing and sporting for two hours together upon the surface of the water. The males and females then seek each other's company, and pass two more hours in copulation. They again return to their sports, deposit their eggs, and in a short time drop down and die. Thus these flies accomplish the short career of their lives in five or six hours, and never survive the day which gave them birth.

Let the history of these diminutive insects teach us, my brethren, the fallacy of our ideas with regard to the duration of our lives in comparison of eternity. Let us suppose that one of these flies had prolonged his active existence to twelve hours, and that it had consequently attained to a much more advanced age than any of its contemporaries, most of whom died about noon. Were this ancient insect endued with speech, it would perhaps, about sun-set, shortly before its dissolution, address its assembled friends in language something like this:—

Of the ephemeron.

"I now find by experience that even the longest life must have a conclusion. The end of mine is arrived, and I meet it without regret, for my age has for some time been a burden to me, and I have found nothing new under the sun. All that I have seen in the course of my protracted life has taught me that nothing here can be of perpetual duration. A whole generation has been destroyed by a blast, and a cool breeze swept away a great portion of our youth. I have lived in the early ages of the world, and have associated with insects who far surpassed any of the present race in talents, strength, and wisdom. I assure you that I have seen this sun, which is now so near the earth, shining in the midst of the heavens. The earth was formerly much lighter, and our forefathers were much more temperate and virtuous than we. I have seen much in the course of my life, which began many, many years ago, when the sun commenced his flaming career in the heavens. But now that he is withdrawing from the earth, I foresee the approaching dissolution of all Nature. O my friends! how fondly I once flattered myself that I should live for ever. What magnificent cells I constructed for my habitation! What reliance I placed on the excellence of my constitution, the vigor of my body, and the strength of my wings! I have, however, lived long enough, and none of those whom I leave behind me will live to better purpose than I have done."

Such would probably be the language of an insect after a life of about twelve hours on the earth. But might not the same words be put into the mouth of a man who has passed eighty years in the world? Indeed, my brethren, the difference between twelve

hours and eighty years is very small in comparison of eternity; and do we in general spend our eighty years to better purpose than the twelve hours are employed by the ephemeron?

## *JULY 20.*

### NOTHING PERISHES IN NATURE.

If there were any objects in Nature which perished without being productive of any useful end, we might justly question the wisdom of Providence; but we may confidently assert that in the wide empire of the creation not the smallest atom is lost, but that every thing exists for certain purposes, and that every object accomplishes in one way or other the ends for which it was created.

The seed which falls from a flower is not destroyed; it is often carried away by the winds, strikes root in the earth, and becomes a tree. Other grains and fruits are consumed by birds and various kinds of animals, and, mingling with their juices, are concocted and prepared, either to serve as manure for the fields, to contribute toward the support of man, or for other purposes. Certain things decay, and are reduced to dust, but yet they only become parts of a different substance, and in their new form answer ends for which in their former state they would have been unfit. Would they have been able to accomplish these, had they not been prepared by various changes and metamorphoses? The butterfly could never have propagated his species, had he not first been a caterpillar. Any animal whatever could not have existed unless the germ had been previously formed in the

blood of his progenitors. Nothing, therefore, perishes in Nature; it is only dissolved in order to assume a new form, or to become incorporated in a new body. Every atom teems with new creatures, and forms a link, without which the grand chain of Nature would be imperfect. Take up a handful of the sand upon which you tread, and you will perhaps destroy thousands of insects by which it is inhabited. If we were more perfectly acquainted with the constituent parts of things, we should be enabled to ascertain in what others the embryo, or principles of each were originally comprehended.

Methinks I hear some one ask: But are not the human fœtus which does not arrive at maturity, and the infant which dies soon after its birth, to be considered as creatures that perish without having been of any utility? They do not absolutely perish; they accomplish, in their way, the designs of the Creator, and are prepared by various changes for their future state. Nature does nothing by leaps. A man was once a child, and a tree a tender shoot. Every creature exerts its energies during the short period of its existence, and developes itself for a new state. The progress of man from the mere sensitive faculties of infancy to the mature reason of adult age, is certainly not more extraordinary than that which the unborn embryo must make before it acquires animation and feeling. It would therefore be as unjust to assert that such an infant has not fulfilled the purpose for which it was created by the Almighty, as to say the same thing of a grown person, because he has not accomplished in this mortal state those ends for which he is not destined till he becomes a partaker of everlast-

ing bliss. Every creature fulfils its destination, according to its manner and its faculties. Like the wheels of a watch, one moves more swiftly, another more slowly, and all tend, directly or indirectly, to the primary object of their existence. All of them exercise the energies with which they have been endued, and each contributes, according to its ability, to the execution of the general plan which God has formed.

You will meet, my dear readers, with innumerable objects in Nature, which at first sight may perhaps appear of no utility, and consequently to have been produced without design. Many others will seem to be utterly annihilated; but let us not be too precipitate in our judgment, and hastily arraign the wise dispensations of God. Let us rather believe that whatever we see, however incongruous it may appear, has been decreed by supreme wisdom; and that God accomplishes his object when we short-sighted mortals are unable to fathom the wisdom of his designs.

Believe, then, that the hand of the Creator hath arranged all things with infinite wisdom and sagacity. Look around you; none of the objects which you perceive owes its existence to chance. There is nothing in the world but what is productive of some utility, even when it is reduced to dust. Nothing perishes in Nature; not the smallest leaf, not a grain of sand, not an insect too dim native for the human eye to discern, not an atom that floats in the air. The firmament illumined by the glorious orb of day, and the smallest particle that floats in the sun-beam, were alike created by the almighty fiat, and shall endure for ever. All the works of his hand bear the impress of perfection;

and yet man, foolish and presumptuous man, dares to censure the dispensations of the Eternal.

Let me beware of imitating such examples. Let me rather glorify God, and ensure my own peace of mind by believing that no created object can perish. Consequently my body cannot be annihilated, even though it is continually decaying, though it shall once be reduced to dust in the grave, and be incorporated into many other totally different substances.

## *JULY 21.*

### DIFFERENCE OF CLIMATES.

FROM the spherical figure and the twofold motion which the Creator hath given to the earth, it cannot be otherwise than that the different regions of the globe must vary from each other with respect to the temperature and seasons, as well as in regard to the animals and vegetables which they produce. In certain countries there is but one season; there summer incessantly reigns, and every day in the year is as hot as the warmest in our climate. These countries are situated in the middle of the globe, and occupy the space which is denominated the torrid zone. The most fragrant and delicious fruits that Nature produces grow only in these latitudes, and there she has lavished her richest treasures. The days and nights are nearly of equal length there throughout the whole year.

There are regions, on the contrary, in which the cold during the greatest part of the year is so intense as to exceed the utmost severity of our winters. It is only during a few weeks that there is

warmth sufficient for the vegetation of a few plants and wild shrubs. But these frozen regions produce neither fruits nor roots for the subsistence of man. There we find the greatest inequality of days and nights, as there are both which last for weeks together.

The greatest part of the earth is occupied by the two temperate zones, situated between the torrid zones. In the countries comprehended by them, four different seasons are more or less distinctly observed, according as they are situated at a greater or less distance from the contiguous zones. These seasons are: the spring, when the trees put forth their leaves and blossoms, when the heat is moderate, and the days and nights of nearly equal length; summer, in which the fruits and harvests ripen, when the heat is most powerful, and the days are considerably longer than the nights; autumn, when the trees lose their fruits, seeds, and foliage, the herbage withers, the days and nights are again of equal length, and the heat gradually decreases; winter, when the nights are longer than the days, when the vegetation is either wholly, or in a great measure suspended, and the cold becomes more or less severe. The regions of the temperate zones are so situated on either side of the torrid zone, that they have contrary seasons at one and the same time. When it is winter in one it is summer in the other; and the autumn of the northern temperate zone is the spring of the southern. These countries seem to possess the greatest variety of productions, both animal and vegetable. The vine, which will not thrive either in very hot or very cold climates, is peculiar to them. The inhabitants of these zones are also superior in many respects to

those of the others. The people inhabiting the frigid zones are small in stature, and deficient in point of intellectual qualifications. The natives of the torrid zone have stronger passions, and less energy, both of body and mind, than those of the temperate zones.

However different the regions of the globe may be, the Creator has made such arrangements as are conducive to the well being of their inhabitants. He causes each country to produce those things which the nature of the climate renders most needful for the people residing in it. For the natives of the torrid regions, a worm, that feeds upon the leaves of the mulberry tree, spins a web, of which they make silk, that serves them for clothing. In the same countries there is both a tree and a shrub, that bear a kind of pod, containing a very fine, woolly substance, with which light stuffs are also manufactured. The cold countries, on the contrary, abound with animals which afford abundance of furs for the clothing of the northern nations, and are covered with vast forests, which supply them with plenty of fuel. To cool the blood of the inhabitants of the south, their fields and gardens furnish them with refreshing fruits in such profusion, that they can spare a large quantity for the people of other countries. In the cold regions God compensates the deficiency of vegetable productions by the prodigious abundance of fishes contained in the seas, rivers, and lakes; and by the vast number of animals, most of which, it is true, wander about wild in the forests, and are a terror to man; but yet supply him with the most valuable skins for clothing, flesh for food, and many needful articles of domestic economy.

Thus there is not a region of the globe whose inhabitants do not receive demonstrations of the greatness and the beneficence of their Creator. No country is so sterile as not to afford, in one way or other, the necessaries, and even the comforts of life. Every where, O bountiful Father, we discover the traces of thy wisdom and goodness. Even those trackless desarts, and those mountains towering to the very clouds, that cover a large portion of Asia and Africa, contain monuments of thy wisdom and loving-kindness. Even in the polar regions, mantled in everlasting ice and snow, as well as in our temperate climates, songs of praise ascend to thee, O Father of all beings. In every language the tribute of glory and gratitude is paid to thy name. From the regions in which we dwell hymns of thanksgiving ought more especially to ascend to thee, who hast so highly distinguished us by thy favor from so many millions of the inhabitants of the globe.

## *JULY* 22.

### REMARKABLE PHENOMENA OF THE SEA.

It is usual to consider the sea only in a terrific point of view, without paying attention to the divine wonders and benefits which it presents to our view. It cannot, indeed, be denied that the ocean is one of the most tremendous elements, when the tempest roars, and its impetuous billows are swelled into mountains. It drives ships far out of their course, and beats against them with such violence that they are at length completely filled with water, and swallowed up by the waves; or it casts them

upon sand-banks or upon rocks, where they are dashed to pieces. Sometimes a vessel attracted into the vortex of a whirlpool, is hurled round in rapid circles, and finally absorbed in the fathomless abyss. These whirlpools are occasioned by the meeting of numerous currents and eddies in vast caverns at the bottom of the sea, by the confinement of its waters in narrow channels, and by rocks. Not less dangerous are the water-spouts, which the wind raises into the air. These masses of water hover over the surface of the sea, and are whirled round with great violence by the wind. They often burst with a tremendous noise, and are sometimes productive of fatal effects: for when vessels come within the sphere of their action, they raise them up into the air, and letting them fall again, dash them to pieces, or whelm them in the deep; or at least they carry away the masts and rigging, and fill the ships with water. In this manner vessels are frequently destroyed, with all their crews.*

* With respect to the causes of these formidable phenomena, philosophers are not agreed. Many have considered them as the effect of electrical attraction, while others have ascribed them to a sudden rarefaction of the air, and others again have endeavored to account for their formation by the convergence of winds. A water-spout commonly begins with a very small cloud, which mariners term a squall, and which soon augments into an enormous cloud, of a cylindrical form, or that of a reversed cone, and produces a noise like an agitated sea, sometimes emitting thunder and lightning, pouring down large quantities of rain or hail, and overwhelming every thing which it encounters in its course. Mariners, when they perceive the approach of a water-spout, frequently endeavor to break it by firing a cannon before it approaches too near the ship. Mr. Nicholson, in his *Philosophy*, introduces the following obser

But we should be extremely ungrateful were we to consider only the calamities occasioned by the sea, without taking notice of the magnificent works of the Lord, and the wonders of his goodness displayed in the deep. The first thing which appears worthy of remark is the saltness of the sea, which is so great, that one pound of water is said to contain two ounces of salt.* Sea-salt produces no sediment, and consequently appears lighter than common salt. Nevertheless, it is not diminished by evaporation, or by the continual influx of fresh water, and the cause of this has never been ascertained. It may be that mountains of salt exist in the ocean, but in this case the sea would be much

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vations, which greatly strengthen the hypothesis that ascribes these phenomena to electricity:—"It was observed of water-spouts, that the convergence of winds, and their consequent whirling motion, was a principal cause in producing that effect; but there are appearances which can hardly be solved by supposing that to be the only cause. They often vanish, and presently appear again in the same place; whitish or yellowish flames have sometimes been seen moving with prodigious swiftness about them. The time of their appearance is generally those months which are peculiarly subject to thunder-storms, and they are commonly preceded, accompanied, or followed by lightning, the previous state of the air being alike in both cases. And the long-established custom which the sailors have of presenting sharp swords to them, is no inconsiderable circumstance in favor of the supposition of their being electrical phenomena." T.

* The proportion of salt contained in sea-water varies considerably in different climates. It is salter toward the equator than near the poles. In the Baltic, one pound of water yields only a quarter of an ounce of salt; near Holland half an ounce; and in the British seas about two ounces. T.

salter in some places than in others.* It is possible that the rivers may carry along saline or nitrous particles with their current to the sea; but how could these affect the prodigious extent of ocean? But be the cause of this phenomenon whatever it may, so much is certain, that the saltness of the sea is necessary for the accomplishment of certain ends. It is this that preserves its waters from becoming putrid, and, by encreasing its gravity, renders it capable of transporting greater weights.

The color of the sea-water likewise appears worthy of notice. It is not every where alike. Exclusive of the effect produced in all water by the color of the bottom and that of the sky, besides its appearing black where it is of great depth, white with foam during storms, and tinged with gold and silver and the most brilliant hues when the setting sun seems to plunge beneath its waves; various species of insects, the putrid relics of marine plants, the mixture of different substances which the rivers carry with them, communicate peculiar colors to certain parts of the ocean. Sometimes its unruffled surface appears to be studded with thousands of glistening stars; sometimes the track of a vessel is marked by a stream of fire, and the fishes themselves that appear above the water exhibit the same luminous appearance. Recent experiments have proved that this phenomenon entirely proceeds from the putrescent particles of marine animals.

* This we have seen in the preceding note is really the case, but it is ascribed either to the more considerable evaporation which takes place, for instance, near the equator, or to the influx of fresh water from rivers, as in the Baltic and other seas. T.

Remarkable phenomena of the sea.

A well-known property of the sea is the ebbing and flowing of the tides. The sea rises and falls twice every day, or, more strictly speaking, in twenty-five hours. The rising of the tide is called the flood, and the falling of the water the ebb. The following circumstances attending this phenomenon are worthy of remark. Two points of the earth have ebb and flood invariably at the same moment; these points are exactly opposite to each other, that is, our antipodes have the flood-tide at the very moment when we perceive it here. The flood is always least considerable about the first and last quarter of the moon, and it is in general highest three days after the new and full moon. Fortuitous circumstances may, however, cause the flood to arrive earlier, and to rise higher at one time than another. Though philosophers have not yet been able to account for this phenomenon in a manner perfectly satisfactory, yet so much is certain, that ebb and flood are productive of the greatest advantage to the world, partly in respect to the purifying and cleansing of the sea, and partly in regard to navigation.

Should all these things, wonderful as they are, be insufficient to awaken our curiosity, yet perhaps the animals which inhabit the ocean may excite our astonishment. Here we discover a new world, and the number of beings which compose it is prodigious. The species of the aquatic animals are, indeed, not so numerous as those of the land animals, but they far surpass all those that inhabit the earth or air in magnitude or longevity. The elephant and the ostrich are very small in comparison of the whale. This is the largest among the tenants of the deep, his length being often from sixty

to seventy feet; he lives as long as the oak, and no land animal can vie with him in respect to length of life. Nay, if we were to give credit to the account of certain writers, the ocean contains a species of animals far exceeding the whale in size. This fish is called the kraken; it is said to reside in the northern seas, and to be two or three miles in circumference.* And who can name the animals with which the sea is peopled? Who can express their numbers? Who can describe their variety, structure, size, form, and properties?

From these considerations, my dear reader, you cannot forbear deducing this conclusion: How infinitely great is that God by whom the ocean was created! It was not without the wisest reasons that he covered nearly two thirds of the globe with oceans and with seas; they were not only destined to be the reservoirs of all the waters of the rivers, but by means of their evaporation to be the source of rain, snow, and other meteors What wisdom is manifested in the connection which the seas have with each other, and their incessant motion from east to west! We shall discover traces of equal sagacity if we consider the interior arrangement of the sea, the bottom of which is of the same nature as the surface of the earth. In the sea we find rocks, vallies, caverns, plains, springs, rivers, vegetables, and animals. Islands are nothing but the summits of prodigious mountains. When we farther reflect that the seas form that portion of our globe which has been least investigated, we shall

*The existence of the kraken, which rested principally on the report of the good, but credulous Pontoppidan, is now known to be altogether fabulous. T.

have reason to believe that it contains many other wonders, which neither the senses nor the understanding of man have ever yet apprehended, but all of which attest the wisdom and the power of our Creator. Admire and adore then, O Christian, the greatness of him who hath every where established, in the ocean as upon land, innumerable monuments of his glory.

## JULY 23.

### DIVERSITY IN THE COLORS OF FLOWERS.

At the spectacle of thy works, O adorable Creator, my heart overflows with gratitude and joy! My eye looks around, and discovers beauties without number. What pleasing and manifold combinations of charming colors! What admirable skill is displayed in the distribution of their shades! Here the tints seem to have been laid on by the most delicate pencil; there they are blended according to the strictest rules of art. The color which forms the ground is always so chosen as to heighten the brilliancy of the figures painted upon it, while the verdure in which they are enclosed, or the shade of the leaves, gives new life to the whole. Our bountiful Creator seems to have thus diversified the colors of flowers, that they might excite in us only the most agreeable sensations; and on this account it is that Nature appears in such a variegated dress.

O Lord, how great and how numerous are thy works! And yet how wisely hast thou arranged them all! O my God! I admire the grandeur of thy designs, and am still more astonished at the

wisdom with which thou hast executed them. After oft-repeated attempts and many disappointments, we at length produce a tolerable imitation of one single work of Nature; but thou, O omnipotent, givest in a moment existence and the most perfect organization to millions of beings. The more closely the productions of art are examined, the more defective they appear; but for six thousand years these thy beauteous works have continued to afford delight, and never has any one found a single fault in the plan, or been able to suggest the smallest improvement in the execution. The more we investigate the glorious works of the Deity, the more we shall be transported with their beauty; the more attention we bestow upon this investigation, the more new traces of the supreme intelligence of their divine Author shall we discover.

For my part, what particularly excites my admiration when contemplating the infinite diversity of tints and hues, which I observe in flowers, is the exquisite simplicity of these divine productions. It might be supposed that the Creator must have wanted a prodigious number of different materials in order thus to embellish Nature, and to distribute among the plants and flowers colors so magnificent, so brilliant, and so rich; but, on the contrary, God had no occasion for any toilsome or laborious preparations to render the world a theatre of all imaginable beauties. In his plastic hand a single element assumes every variety of the most beautiful forms. The humidity of the earth, and the air which surrounds it, insinuate themselves into the ducts destined for that purpose, and circulate through a series of transparent tubes. 'Tis these

that perform all the wonders, and produce all the beauties of the vegetable world. These are the sole causes of the charms, the perfume, and the life of every flower. If each different color were the effect of a particular cause, the surprize of the spectator would not be so great; but we contemplate with admiration and delight, as the effect of profound wisdom, a work which, though diversified in its parts, is nevertheless simple in respect to its cause, and in which we perceive that a great variety of effects are produced by a single spring, which constantly operates in one uniform manner.

At this moment, when I am admiring the diversity of colors in flowers, I am more deeply impressed with the value of that reason with which I am endued. Had I not this faculty, I should be deprived of all the pleasures which I derive from the aspect of the flowers. Without reason, this widely extended empire of beauty would have no charms for me; but by the aid of reason I can distinguish the infinite variety, and the numberless combinations of the most pleasing colors, and the diversity of tints exhibited by the meadows, the vallies, the mountains, the forests, the plants, and the flowers: I can not only distinguish them, I can appreciate their beauty, and receive exquisite pleasure from the contemplation of it. Nay, I can do still more: I can ascend from each flower to thee, O almighty Creator, can trace thy glorious attributes in their colors, and praise thee for them. O my God and Father, how can I ever be sufficiently grateful to thee for the gift of reason! It is but just that when I behold thy works, I should thank thee for the faculty by which I am enabled to appreciate and to

enjoy their beauties. What should I be, and what charms would the world have for me, were it not for this inestimable faculty!

## *JULY* 24.

### THE GREATEST HEAT.

It is about this time that we generally experience the greatest degree of heat. This may perhaps appear extraordinary when we are told that the sun, which is now entering the sign of Leo, is daily removing farther from us. When that luminary was nearer to us, the heat was more moderate, but now that he is arrived at a greater distance, it has attained its highest power. Is this phenomenon consistent with the laws of Nature? Yes, reader, and the reason of it lies in the peculiar arrangement of the globe. The sun was lately nearer to us; but as the earth was not thoroughly heated, the warmth was more temperate; now, however, the earth and the bodies upon its surface have, during the past weeks, acquired such a degree of heat, that a weaker influence of the sun produces a more powerful effect than at the beginning of summer, when the earth and the bodies upon which it acted were cold.

This arrangement of Nature is, however, a source of dissatisfaction to a great portion of mankind. We frequently hear bitter complaints of the violence of the heat by which our bodies are relaxed, and rendered incapable of long-continued exertion. But is it not absurd to repine at these dispensations, which are irrevocable, because they are founded on the nature of things and the immutable laws of

the universe? Are we not guilty of ingratitude to our heavenly Father, when we arraign his government, which ultimately tends to the benefit of the world? And would you, my dear reader, seriously wish the weather at this season of the year to be cooler? Would you desire it for your individual convenience? For your sake would you wish to prevent the various productions which are destined for the support of man during the ensuing winter, from arriving at maturity? Your discontent, I repeat it, argues excessive ingratitude to your Creator, who has already counterbalanced certain inconveniencies by certain advantages. The inhabitants of the western part of Africa, particularly those on the coast of Cape Verd, and in the island of Goree, who are exposed, during the whole year, to the most intense heat, are provided by the Creator with such resources as render their lives not only supportable, but also happy. He has so organized their bodies that they can endure the scorching rays of a tropical sun without injury to their health; and the winds which continually blow in those regions are expressly designed to temper and cool the air.

And hath the Creator been less bountiful in his dispensations towards us? How unpardonable should we be, were we to shut our eyes against the traces of his goodness displayed even in the heat which seems so oppressive! Is it not a striking demonstration of his tender care, that he has so constituted the nights of summer that they contribute exceedingly to temper the heated atmosphere? The nights produce a coolness which checks the expansion of the air, and enables it to act more powerfully on bodies. A single night imparts new

life and vigor to the languishing plants and enfeebled animals, and affords us so many conveniencies that we forget the heat and fatigue of the preceding day. Even the thunder-storms, which cause so much terror, are made by the Creator the means of cooling the air. And how many delicious fruits hath he given us that tend to preserve our health, and are the more valuable, because they may be procured even by the most indigent.

Cease then, O Christian, to complain of the violence of the sun's heat, and repine not at the weight of the afflictions under which thou languishest; both belong to the plan of the wise government of God. Both are alleviated in a thousand ways, for which praise, honor, glory, and thanksgiving are due to that Supreme Intelligence which rules the universe and superintends the fate of mortals.

## *JULY* 25.

### OF VARIOUS REMARKABLE PHENOMENA IN ANIMALS.

THE animal kingdom presents us with a greater variety of remarkable objects than any of the other divisions of Nature. To a lover of the works of Nature it is highly interesting to contemplate the various instincts of animals; but to the reflecting observer these are a subject of something more than mere amusement. In the actions of animals he discovers a superior intelligence, which far surpasses all human conceptions. In this light also I hope that my readers will view the following singular facts relative to certain animals.

The manner in which birds and insects lay their eggs, is worthy of attention. The grasshopper, the

lizard, the tortoise, and the crocodile belong to the number of those animals which give themselves no concern either about their eggs, or the young that issue from them. They deposit their eggs in the earth, and leave to the sun the operation of hatching them. Other species of animals, from a natural instinct, lay their eggs in places where the young find food adapted to their nature as soon as they are hatched. In this point the mothers never make a mistake. The butterfly, the offspring of the herbivorous caterpillar, will not lay her eggs upon flesh, neither will the flesh-fly deposit her eggs upon vegetables.* Some species of animals are so careful of their eggs as to take them with them wherever they go. The wandering spider carries hers in a little silken bag. When the young are hatched, they place themselves in a certain order on the back of the mother, who travels about with her burden, and continues for some time to provide for them. Certain flies deposit their eggs in the bodies of living insects or in their nests; and not a plant exists but what furnishes one or more species of insects with a habitation and subsistence. A fly makes a puncture in an oak-leaf, in which she deposits an egg; the wound soon closes, the part swells, and an excrescence or tubercle, called a gall, makes its appearance. The gall increases

* Though this observation of the author may, in its general application, be correct, yet we shall presently have occasion to observe that it does not hold good in the particular instance which he has selected. The flesh-fly, it will be seen, certainly does lay her eggs in vegetables, not in consequence of a mistake, but from an instinct nearly approaching in appearance to the faculty of reason. T.

in size, as does also the egg which it contains; and the insect which it produces is thus provided at its birth with lodging and food.*

The care of animals for their young is almost incredible: and their parental love is sometimes stronger than their attachment to life itself. With what assiduity quadrupeds suckle their offspring! They lick them, and thus heal their wounds; they carry them, when it is necessary, from place to place; they keep them together, protect, and conduct them. If they are carnivorous, what pains the mother takes to procure them flesh! With what art she instructs them to pursue their prey, to play with it when in their power, and at last to tear it in pieces! It is impossible to read without emotion the account of a bitch, which, when she was cut open alive for dissection, licked her young ones, as if to mitigate her tortures, and set up a most lamentable cry when her offspring were taken from her. The porpoise in a storm receives her young

* If the instinct of the gall-fly in thus making a provision for its young, excites the admiration of the reader, the following circumstance will not fail to increase his astonishment. The gall, as we have seen, contains the egg of the insect, which in due time is transformed into a larva, or grub. Surrounded, as it were, with a thick and solid wall, this grub might be thought secure, within its impregnable castle, from every danger. Nature, however, has taught another insect, no less feeble than the parent gall-fly, the means of obtaining access. This is the flesh-fly, which is provided with an auger for the same purpose as the other. With this instrument she bores a hole in the gall; she deposits her egg, which produces a grub or worm that feeds upon the former inhabitant. Surely we are justified in believing that the instincts of animals are emanations of the divine intelligence. T.

into a part of her mouth separated from the rest for that purpose.

Every species of animals has its particular instincts and its particular wants; and the Creator has made a provision for both. Of this the animals which are obliged to seek their nourishment in water, afford abundant demonstration. Let us consider the aquatic birds. Nature has furnished their feathers with an oily fluid, which the water cannot penetrate, lest they should be wetted and rendered unfit for flying. That they may be enabled to raise themselves into the air, the proportions of their bodies are widely different from those of the other birds. Their legs are placed much nearer the tail that they may hold themselves erect, and keep their wings above water. Their feet are provided with webs for swimming; to facilitate their diving their body has a peculiar structure; and for seizing their food they have a broad bill and a long neck; in a word, their conformation is in every respect adapted to their mode of life. The nautilus is a shell-fish resembling the snail species. When he wishes to ascend, he advances to the front of his shell, expelling the water at the aperture to render it lighter. When he wishes to sink, he retires to the back of his shell, which, filling with water, in consequence becomes heavier. If he chuses to float on the surface, he dexterously turns his shell, which then resembles a boat, and extends a membrane, which is swelled by the wind, and serves for a sail. It is conjectured that this little animal might have suggested to man the first idea of navigation.

These and other actions of animals must lead us to the same inference as their structure. The same

wisdom which formed their bodies, constructed their members, and ordained them to concur in one common purpose, has likewise regulated the various actions which result from their animal organization, and has caused them all to conduce to one end. The brute is guided by the invisible hand of the Creator; he produces, without instruction, works so perfect as to excite our admiration; he seems to be actuated by reason; he stops at the proper time, alters his work according to circumstances, and yet in all his operations follows only certain secret instincts by which he is impelled. He is a machine, incapable of judging of what he does, but governed by the adoraable wisdom of his Creator, which has prescribed to each insect, as to each planet, the sphere in which it is to to move. When, therefore, I observe the ingenuity, the cunning, and the skill of animals, I am filled with veneration, and imagine that I am beholding a spectacle secretly directed by the almighty artist, concealed, as it were, behind a curtain. Whoever considers the works of God with attention, will every where discover traces of his hand; and in contemplating the admirable structure of his creatures, he will be filled with sentiments of profound awe and gratitude toward that great Creator, from whom all the animals have received their faculties and instincts.

## *JULY 26.*

### OF THE HUMAN COUNTENANCE.

THE exterior conformation of man alone bespeaks his superiority over all living creatures. His face

directed towards heaven, bears the impress of majesty engraven on every feature; and from his countenance may be inferred his dignity and important destination.

As long as the soul remains perfectly tranquil, all the features of the face are in a state of repose; but when the mind is agitated, the countenance becomes an animated picture in which the passions are delineated with equal delicacy and force. Every affection of the soul has its peculiar expression, and every alteration of the features is a characteristic sign of the most secret emotions of the heart. The eye, in particular, expresses these passions so distinctly, that it is impossible to mistake them: it is in a superior degree to any of the other organs of the senses, an immediate interpreter of the soul, by means of which the wildest passions and the softest emotions are expressed with the greatest truth and force. Hence the eye may with propriety be called the mirror of the soul and the organ of the understanding. The motions and color of the eye contribute more than any thing else to mark the character of the countenance. The human eyes are comparatively nearer to each other than those of any other creature. In most animals the interval between them is so great that it is impossible for them to see any object, unless it be at a great distance, with both eyes at once.

Next to the eyes, the eye-brows contribute most to fix the character of the countenance. Being of a different nature from all the others, their peculiar color renders them more conspicuous than any other feature of the face. They form the shade of the picture, give relief to the composition, and eighhten the coloring. The eye-lashes, when long

and thick, likewise contribute their part; they give additional beauty to the eye, and grace to the countenance. No animals, but men and monkeys, have both eye-lids ornamented with hairs; some being without them on the lower eye-lid, while in man they are much longer on the upper than on the lower. The eye-brows have only two motions, which they execute by means of the muscles of the forehead; by the one they are elevated, and by the other they are depressed, and at the same time approach nearer to each other.

The eye-lids serve to protect the eyes, and to prevent the transparent cornea from becoming dry. The upper can rise or fall, but the lower has very little motion. Though the motion of the eye-lids is dependent on our will, yet it is not in our power to keep them open when they are oppressed by lassitude or sleep.

The forehead is an important portion of the face, and one of those which most contribute to its beauty. It must, however, have the due proportions, and be neither too round nor too flat, neither too small nor too large, and be regularly adorned with hair at the top and on either side.

The nose is the most prominent part of the face. As it has very little motion, and that only during the most violent passions, it adds more to the beauty than to the expression of the countenance. Next to the eyes, the mouth and lips are most susceptible of motion, and express the passions with the greatest force. As the mouth is affected by the motions of the face, it indicates by its various changes the alterations which there take place. This part is continually animated and set in action by the organ of voice. The roseate bloom of the

lips and the whiteness of the teeth heighten the beauty of the human face.

So far we have considered the human countenance merely with respect to the beauty and regularity of its parts, without unfolding the design and different uses of those parts. But in this point of view only we discover the infinite wisdom of our Creator, who in all his works hath combined beauty and utility. We, who are so often transported with the charms displayed in the countenances of others, ought to sanctify and heighten our admiration by thinking of him, by whose power and wisdom every part of our body is so exquisitely formed. While we contemplate the human face, we ought to reflect on the superior advantages which the Creator hath given us in this respect over all other animals; and to think at the same time on our high destination, of which the structure of the face alone may convince us. The parts which compose it have been bestowed on us for far nobler purposes than the irrational animals are designed to accomplish. The eye is made to contemplate with joy the Almighty in his works; the mouth to sound forth the praises of our adorable Creator. All the features of the face ought to attest the goodness of the heart and the rectitude of our sentiments. The ravages made in our faces by disease and death ought to prevent us from ever being vain of our personal charms. This last consideration may, however, render us sensible of the felicity which awaits us at the resurrection of the dead, when all the features of our face shall be embellished and fashioned in the manner most suitable to our future enjoyments in the mansions of bliss.

## JULY 27.

### DESIGN OF THE CREATOR WITH RESPECT TO THE GRAVITY OF BODIES.

GOD hath endued all bodies with a force by which they are compelled to act at all times, in all places, and in all directions. If the motion of a body tends more powerfully toward one point than to another, we say that it gravitates toward that point; for experience teaches us that bodies have a tendency to descend, or that when they are at a considerable distance from the ground, and are not supported, they fall down perpendicularly to the earth. The reason of this gravitation cannot lie in the body itself, for a falling body remains in the state in which it was first placed, till it is changed by some external cause. It is equally impossible that the air should be the cause of this gravitation, for, possessing weight itself, it would rather retard the velocity of falling bodies. We must therefore presume the existence of a very different cause. Perhaps we shall come nearest to the truth, if we adopt this opinion, that the earth possesses the power of attracting all bodies that are within a certain distance, in the same manner as the magnet attracts iron; or perhaps the cause of gravity is to be imputed to some particular extraneous matter diffused through all bodies.

Though we are unable exactly to ascertain the cause of gravity, yet nothing can be more evident than the advantages resulting from it. To go no farther than ourselves, without gravity we should not be capable of moving our bodies as we do. Our centre of gravity is between our feet. When we

raise the right leg, we must first transfer this centre of gravity to the left. If we bend forward we are ready to fall; but by advancing the right leg we prevent our fall, and make a step. Thus walking is a continued series of falls, during which the centre of gravity is always preserved between the legs. Hence we bend the body forward when we ascend a hill, and backward when we descend. We incline forward when we carry a burden on our shoulders, and backward when we carry it before us. All this proceeds from the laws of gravity, by which all the motions of animals in walking, swimming, and flying are regulated.

The motions of the prodigious orbs that roll in the heavens are produced by gravity. The sun attracts the planetary system, and each planet in its turn attracts its satellites; or, what amounts to the same thing, the planets gravitate toward the sun, and the satellites toward their respective planets; for a body whirled round in a circle flies off in a right line from the centre of its motion, unless it be held by some power. The planets revolve in their orbits with great velocity, and the moon is not bound by any chain to the earth. Her rapid motion must infallibly hurl her to an immense distance in immeasurable space, were she not continually impelled toward our globe by a power which counterbalances the force that tends to propel her from the earth. This power is gravity. Were our earth heavier or lighter than it actually is, what would be the consequence? It would either approach very near to the sun, or fly off to a prodigious distance from that luminary. In the former case the heat, and in the latter the cold would be insupportable. Every thing on the face of the

Manifold effects in Nature from the same cause.

globe would be consumed or frozen. What would then become of the seasons, and a thousand other things which are indispensably necessary for the support and convenience of man?

In this dispensation also, O Being supremely wise, hast thou established a monument of thy wonders. By a medium apparently so simple hast thou regulated the motions of the insect, and of the immense orbs which roll in the firmament. By the laws of gravity alone thou hast prevented the smallest atom belonging to the earth, or to any of the other planets, from being lost. But herein consists the infinite greatness of thy power and wisdom, that by the simplest, nay, even apparently the most contemptible means, thou art able to produce the most astonishing effects. How different art thou in this respect from men, who are often obliged to make great preparations for the accomplishment of trivial and unimportant ends. He who cannot herein discover thy greatness, must be either exceedingly inattentive or exceedingly ungrateful. I will carefully avoid both of these faults. Henceforward I will consider the gravitation of bodies as one of the means of promoting my happiness on earth, and praise thee for it with all my heart and with all my soul.

## *JULY* 28.

### MANIFOLD EFFECTS IN NATURE PROCEEDING FROM THE SAME CAUSE.

THE whole system of Nature is an endless series of causes and effects. As all the parts of the universe bear a relation to each other, every motion

Manifold effects in Nature from the same cause.

and every incident depends on previous causes, and itself becomes the cause of succeeding effects. The whole constitution of the world convinces us, that it was not chance, but a divine art and wisdom surpassing all human conception, that reared this magnificent fabric, that imparted certain motions to its different parts, and determined the great chain of events, which are to depend upon and to succeed each other. This degree of knowledge it is not difficult to attain; for though our acquaintance with Nature is confined within very narrow limits, yet we are able to discover that many great and important effects result from causes that are equally obvious to our senses and our understanding.

Of this, numberless phenomena of Nature may afford a demonstration. What a variety of effects are manifestly produced by the heat of the sun! It contributes, not only to the life of innumerable animals, but likewise to the vegetation of plants, to the ripening of every species of seeds and fruits, to the fluidity of water, to the exhalation of vapors, and the formation of clouds, without which we should have neither rain nor dew. The air, in like manner, is constituted with such art as to answer various purposes. By means of this element, animal life is maintained, and all the vital energies are kept up. By air, fire is fed, and combustion produced; all kinds of sounds are conducted by rapid vibrations to the ear; the feathered tribes are aided in their flight from place to place; and a path is opened for man across the wide and trackless expanse of ocean. By the air the clouds are supported, till, overcharged with humidity, they descend rain; by means of air the day is prolonged by

Manifold effects in Nature from the same cause.

the morning and evening twilight, and speech is given to the tongue, and hearing to the ear. All these, and other advantages are derived from the constitution of the air in which we live and breathe. Is not, then, this wonderful and useful element which surrounds our globe, which, though too subtle to be discerned with the eye, is endued with a force which no other element can resist;—is it not, I say, an evident demonstration of the wisdom of our Creator?

The mere power of gravitation, which exists throughout all Nature, gives solidity to the globe and fluidity to the waters. It retains the ocean within its abysses, and confines the earth to her prescribed orbit: it keeps the spheres at due distances, and every object in Nature in its proper place. How multifarious are the uses of water! It serves generally to dilute, soften, and dissolve many substances, which otherwise would be unserviceable to us. It is the most wholesome beverage, works mills and other machines, is the principal nourishment of plants, supplies us with abundance of fish, and wafts to us on its bosom treasures from all the regions of the globe.—What various and innumerable effects are produced by the element of fire. By means of it solid substances are reduced to a fluid state, or transformed into solid bodies of a different nature; and fluids are boiled or evaporated. It communicates warmth to all bodies, and produces the sense of sight in the eyes of living creatures.*

* This observation, it will be perceived, is founded on the theory which supposes light to be a modification of the matter of fire. T.

Manifold effects in Nature from the same cause.

So manifold are the effects resulting from one and the same cause in the empire of Nature. Equally diversified are the effects which are frequently produced in the moral world from one single moving principle of the soul. The individual impulse of benevolence is productive, after various changes, of many beneficial consequences. From this source proceed the solicitude of parents for their children, social union, friendship, patriotism, kindness in those who govern, and fidelity in those who obey. This impulse keeps each individual in his proper spere, constitutes the bond of human society, and is the principle of all virtuous actions, laudable enterprizes, and innocent amusements.

These considerations, my brethren, afford the most evident proof that the world is not a mass of crude and disjointed materials, without connection, order, or mutual relation; but, on the contrary, that it is a regular fabric, reared with consummate skill by the hand of the almighty architect.* Every part, and every phenomenon of the visible world displays some evidences of the divine wisdom. But how much is there that eludes our enquiries, and even baffles the most attentive researches, and the most profound meditations of the greatest philosophers! If we endeavor to pursue the traces of

* This conviction was deeply impressed also on the minds of the heathen of antiquity who had bestowed any attention on the works of Nature. '*Quod si omnes mundi partes ita constitutæ sunt,*' says Cicero, '*ut neque ad usum meliores potuerint esse, neque ad speciem pulchriores; videamus utrum ea fortuita sint, an eo statu quo cohærere nullo modo potuerint, nisi sensu moderante divinaque providentia.*' De Naturâ. l. 3. c. 34.

divine wisdom, we find them in one place perfectly clear and distinct, while in another they are wholly concealed from our view. Let us therefore, my brethren, so much the more attentively contemplate the works of God, and employ those wonders which he hath so conspicuously manifested, for the glorification of his name. Then will our hearts be deeply sensible of the truth of these words of David: "The works of the Lord are great, sought out of all them that have pleasure therein."

## JULY 29.

### OF MILDEW AND HONEY-DEW.

MILDEW is a whitish substance, like dust, with which plants are sometimes covered. It proceeds not, as is commonly believed, from insects, but from a natural stagnation of the juices, and a disposition to putridity, which attracts insects. This stagnation of the juices is the first step towards putridity, and it has been observed, that this alone is sufficient to invite insects, for they assemble in thousands, whenever any cause, natural or artificial, interrupts the circulation of the juices in a tree. Hence the weakest trees, and those which stand in unfavorable situations, are most liable to mildew. If insects were actually the cause of this malady, it would be impossible to produce it by art. On the contrary, if a tree be purposely wounded, or deprived of the necessary care, it will soon become mildewed. On a tree so weakened, a thousand insects are immediately collected, while the neighboring trees are free from them. Hence the corruption can no more be attributed to the in-

sects, than the putridity of animal substances; but on the contrary, it proceeds from the stagnation of the juices, which may be occasioned by a variety of circumstances.

Honey-dew is a viscous, sweet, but at the same time acrid and burning fluid, which destroys plants. It has been imagined that the insects extracted this glutinous juice by suction from vegetables, or that the bees deposited their honey upon them; but it is now said to be proved by repeated experiments, that honey-dew is a real dew which falls from the atmosphere. In many places it is found in the form of small drops on a great number of vegetables, without distinction; and sometimes in a single night it covers almost all the leaves of a whole row of trees, on which no traces of it were before to be discovered. These facts demonstrate that this substance must fall from the air. Perhaps this dew may be formed from the exhalations of the flowers and blossoms from which the bees extract their delicious honey; perhaps, also, it may be, like mildew, an effect of the vitiated state of the juices of plants; for it is the weakest ears, branches, bushes, and trees that are most liable to the honey-dew. It is farther remarked, that the leaves upon which the honey-dew falls become spotted, black, and shrivelled; and it is more than probable that this substance may be the cause of their decay.

We find traces of the wisdom of the Creator in thus ordaining that the insects which must be supported, should find a subsistence on those vegetables which are already sickly and diseased, and are consequently unserviceable to man. This circumstance is a proof of the particular care which the Creator has manifested withrespect to man in the

arrangement of the universe. Thus these animals are so advantageously provided for, that they consume none of the stores destined for our use, but confine themselves entirely to what might be prejudicial to us. It is certainly consistent with the order of Nature that every animal, every plant, and every tree should afford a subsistence to a particular species of living creatures. We avenge ourselves sufficiently on these insects by endeavouring to destroy them in every possible way. We should perhaps spare them more if we knew how little real mischief most of them occasion.*

* Recent observations have tended to give us more correct notions relative to the nature of the phenomena treated of by the author in this article. The causes and effects of mildew are thus explained by Mr. Marshall, in a late edition of his *Rural Economy of the West of England*:—"That the operation of this disease is carried on by the fungus tribe, evidently appears from the ingenious and persevering labors of botanists. But fungi, it is equally evident, are an effect, not the cause of the disease. They are the vermin of the more perfect vegetables; and fasten on them, whether in a dead, or in a diseased state; but seldom, I believe, while they are in full health and vigor. Their minute and volatile seeds may be said to be every where present,—ready to produce their kind wherever they may find a genial matrix. Such, at least, appears to be the nature of the fungus, or fungi, of wheat; for it may be liable to the attack of more than one species. In a dry, warm summer, which is well known to be favorable to the health, vigor, and productiveness of the wheat crop, the seeds of fungi are harmless, so long as the fine weather continues. On the contrary, in a cold wet season, which gives languor and weakness to the wheat plants, few crops escape, entirely, their destructive effects. A standing crop not unfrequently escapes, while plots that are lodged in the same field, especially in pits and hollow places, become

## JULY 30.

### PROVISION OF NATURE FOR THE NOURISHMENT OF ANIMALS.

IT is a wonderful effect of the divine goodness and omnipotence that the living creatures with

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liable to their attack. And, by the facts above stated, we plainly see that even strong healthy crops may, in a few days, or perhaps in a few hours, be rendered liable to be assailed, not progressively, as by an infectious disease; but at once, as by a blast or blight. In the state of the atmosphere we are to look for the cause of the disease, in a standing crop: and nothing is so likely to bring on the fatal predisposition of the plants as a succession of cold rains while the grain is forming. The coolness necessarily gives a check to the rich saccharine juices which are then rising towards the ear; and the moisture may at the same time assist the seeds of the fungi to germinate and take root."

Sir Joseph Banks, in a short account of the cause of this disease, lately published, observes: "It seems probable that the leaf is first affected in the spring or early in summer, before the corn shoots into straw, and then the fungus is orange colored; after the straw becomes yellow it assumes a deep chocolate brown; every pore will produce from twenty to forty fungi, and every one of these a hundred seeds, which may possibly be scattered by the wind within a week in the hot season, and the latter end of the summer be loaded with this dust. It has long been admitted by farmers, though scarcely credited by botanists, that wheat in the neighborhood of a barberry bush seldom escapes the blight. Some observing men have of late attributed this very perplexing effect to the farina of the flowers of the barberry, which is yellow; but it is known to all botanical observers, that the leaves are very subject to the attack of a yellow parasitic fungus, larger, but otherwise much resembling the rust in corn." The same author far-

which the world is replenished should every where find subsistence. It is not, indeed, so astonishing that the countries which lie within the temperate zones should supply so many different species of animals with nourishment: but that in places which we should suppose destitute of all provision, such an incredible number of creatures of so many different kinds should find support, can be ascribed only to the care of a wise and bountiful Providence.

Consider, in the first place, my dear reader, that God has proportioned the supply of provisions to the numbers and the wants of the animals which are to consume them. There is every where a superabundance of food, but it is not in such profusion as to spoil and become putrid, and thus prove inconvenient and injurious to the world. The most remarkable circumstance attending this is, that

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ther informs us that, "although the seeds of wheat are rendered by the exhausting power of the fungi so lean and shrivelled, that scarcely any flour fit for the manufacture of bread can be obtained by grinding them, these very seeds will, except in the very worst cases, answer the purposes of seed-corn as well as the fairest and plumpest sample that can be obtained."

Notwithstanding the arguments used by M. Sturm to prove the descent of the matter called honey-dew from the atmosphere, it appears to be nothing more than a saccharine fluid discharged by the aphides, or plant-lice, upon the leaves of vegetables. The ant and the bee are very assiduous in their attendance for the purpose of collecting this honey. The former is a constant visitor, but the bee only when flowers are scarce. The ants will suck in the delicious nectar while the aphides are in the act of discharging it, but the bees only collect it from the leaves on which this honey-dew has fallen. T.

among so many species of alimentary substances, the most useful and the most necessary are in general the most common, and propagated with the greatest ease. As the number of animals which subsist on grass and herbage is so prodigious, we every where find the earth covered with grass, and other useful and wholesome herbs and plants, which grow spontaneously, and are not liable to injury from the vicissitudes of the weather. Is it not also worthy of remark, that corn, the principal food of man, may be cultivated with so little trouble, and yields such an astonishing increase?

Is it not a wise arrangement of our bountiful Creator that he has given the animals such a variety of tastes? Some feed upon grass and herbs, others upon corn and grain, and others upon flesh. These devour insects, and those live upon worms; some are content with little, and others can scarcely be satisfied. If all the species of animals were to subsist on one kind of food, there would not be sufficient for them, and the earth would very soon become a desart. The difference of appetite and taste in animals is a certain proof that it is not by accident they prefer any particular kind of food, but that their choice is determined by a particular instinct implanted in their nature. Thus all the productions of the earth and sea are properly distributed; and not only every creature that breathes is provided with an abundance of wholesome nourishment, but those things which would otherwise become putrid and prejudicial to the world, are turned to an advantageous use. The most salutary plants would perish; fishes, birds, and other animals would putrefy, and exhale pestilential efflu-

via, had not the all-wise Author of Nature decreed that those substances should furnish an agreeable aliment to a variety of creatures.

Food spontaneously presents itself to most animals; but nevertheless they have occasion for great discernment, caution, and prudence; for different kinds of aliments have been provided for different creatures. What is food for one, is pernicious, and even fatal to others. Botanists have found by actual experiments, that out of a certain number of plants, the ox eats two hundred and seventy-six, and rejects two hundred and eighteen; the goat feeds upon four hundred and forty-nine, and leaves one hundred and twenty-six; the sheep eats three hundred and eighty-seven, and refuses one hundred and forty-one; the horse consumes two hundred and sixty-two, but will not touch two hundred and twelve; and that the hog devours seventy-two, and leaves one hundred and seventy-one.* Some animals are obliged to go a considerable distance in quest of food, and to take great trouble to obtain it, by burrowing in the ground, picking it up in a thousand places in which it is scattered, or even seeking it in another element. Many are obliged to chuse the dead of night to satisfy their hunger with safety. Others are first necessitated to prepare their food, to separate the grain from the husks, to crack hard stones of fruits, to swallow

* The experiments here alluded to were made in Sweden by the celebrated Linnæus. Their results, as given by the author, differ considerably from the account of them introduced by M. de Saint Pierre, in his *Studies of Nature*; but I have not at hand the means of ascertaining on whose side the error lies. T.

small pebbles to assist digestion, to throw away the heads of insects, to break the bones of the animals they have caught, to turn fishes round in such a manner as to swallow them with the head foremost. Some would perish unless they were to carry into their retreats a supply for a future time of need; others cannot catch their prey without great craft and address, without pits, nets, and snares; while others pursue it on the earth, through the air, or in the waters.

The more various is the food of animals, so much the more we must admire the wisdom and goodness of God in the preservation of his creatures. Let us often meditate, my brethren, on the supreme beneficence and wisdom of our Creator. How many occasions shall we then find to praise the ineffable tenderness of our heavenly Father!

## *JULY* 31.

### OF THE VARIETIES OF THE HUMAN STATURE.

THE stature of man in different regions of the globe varies considerably: the ordinary height of the human body is between five and six feet. Some of the nations contiguous to the Frozen Ocean, and the inhabitants of the mountainous tracts of northern regions are less than five feet in height. The shortest race of men that has yet been discovered resides on the highest mountains in the interior of Madagascar. They are said to be scarcely four feet high. Many of these diminutive tribes are descended from nations of the usual stature; and their decrease in size must be principally ascribed to the nature of the countries which they inhabit. As the

cold which prevails there during the greatest part of the year stints the growth of animals and vegetables, why may it not affect man in a similar manner?

There exist, on the other hand, whole nations that are of gigantic stature. The most celebrated of these are the Patagonians, who dwell near the Streights of Magellan. They are said to be from seven to ten feet high.* That it is not impossible there may exist a people considerably exceeding the ordinary stature of Europeans, is proved, not only by the authentic records of antiquity, but by the numerous instances that occur of persons who attain the height of six feet and a half, and are yet perfectly well made, healthy, and capable of every exertion that demands strength and agility.

In these varieties of human stature also is thy wisdom manifested, O adorable Creator! All that thou hast produced in the animal, vegetable, and mineral kingdoms is wisely proportioned. Every thing bears thy impress, the dwarf and the giant, the blade of grass and the oak, the mite and the elephant.

### *HYMN OF PRAISE.*

GLORY be to God most high! Ye heavens, praise the Lord! Who would not take delight in

* Such is the account given by Captain Wallis and other English navigators who about forty years ago visited Patagonia. More recent writers differ considerably from their statements relative to the stature of the Patagonians. It was measured with great exactness by some Spanish officers in 1785 and 1786, who found it to be at the most seven feet one inch and a quarter, and the ordinary height from six and a half to seven feet. T.

praising the Eternal! O sun, exalt his power, and thou, O moon, proclaim thy almighty author! And you, ye stars, ye brilliant lamps of night, give glory to our God! Ye clouds, which he supporteth in the atmosphere, announce his greatness. He spoke, and ye received existence. Let every thing that exists rejoice in his goodness. Extol his name, all ye inhabitants of the earth. Let the whale from the abysses of the deep praise the Creator. Let the fire proclaim his strength, and the mountains his power; let the vapors as they exhale be an incense ascending to his praise. Let the tempest, which at his command threatens us with destruction, but yet ultimately contributes to our welfare, be an anthem in honor of his might. And you, peaceful flocks, that browze the herbage of the fields, and you, ye trees, laden with his blessings, celebrate the magnificence of our God! Let the strains of the feathered inhabitants of the air, let the industry of the insect that crawls in the dust, let every thing that exists extol his majesty! Great is God, Jehovah! Let us praise, let us exalt his holy name! The heavens and the earth are full of his glory.

## *AUGUST.*

### MEDITATION ON THE WORKS OF NATURE.

O FATHER and Creator of the universe, who nourishest and preservest every thing that breathes, how great is thy majesty! What wonders thou unfoldest to the eye of man! It was thy hand that expanded the heavens, and bestudded them with stars!

Meditation on the works of Nature.

To-day I behold the resplendent sun, whose beams animate all Nature; but to-morrow, perhaps, no more for me shall the woods, the vallies, the meadows resound with the melodious strains of their feathered inhabitants. I feel that I am mortal; the life of man fades like the grass of the field; it withers like the leaf that is separated from the parent branch. Who knows how soon he may hear this awful summons of the Almighty: "Man, return to dust!" When the grave shall have closed upon me, when darkness and silence shall surround me, and worms shall prey upon this mortal frame, what then shall be left me of all the goods of this world? Will they not all be lost to me, even though my utmost desires had been gratified, and unmingled happiness had been my portion here below?

O how foolish should I be, were I to place my affections on the perishable goods of the earth, were I to grasp at great riches, were I to aspire to vain honors, and suffering myself to be dazzled by the false splendor of their meretricious charms, were I to admit envy and pride into my heart!

If urged forward by my passions, I have pursued those imaginary goods to which I ought not to have aspired, O my God, I humble myself before thee. With perfect resignation I bow to the decisions of thy wisdom.

Man, blinded by his pride and presumption, prescribes laws to his Creator; he presumes to arraign the decrees of eternal wisdom. And yet, thou all-powerful friend of man, thou lovest him better than he loves himself, when thy bounty refuses the specious boon which is the object of his desires.

Meditation on the works of Nature.

When the wings of night have cooled the burning atmosphere of summer, and morning exhibits the smiling face of Nature, begemmed with dew-drops, Wisdom says to me: "Why, O mortal, why wilt thou harbor in thy bosom this solicitude respecting futurity? Why wilt thou suffer anxious cares to oppress thy soul? Is not God thy Father, and art not thou his child? Will not he who formed thee keep a watchful eye over his work? The plan of thy existence is not confined to the earth; it extends to heaven. Life lasts but for a moment, and the longest earthly happiness is but a pleasing dream. O man, thou art destined for immortality!"

Immortality! transporting thought! thou raisest our souls above the earth, above the universe, above the empire of time. Present thyself to my heart, when, seduced by false phantoms of happiness, it is ready to forsake the path of virtue.

The roses which crown the brows of the wicked soon begin to fade; he is disgraced by his vicious pleasures, which are succeeded by remorse. I am but a pilgrim on the earth, and none but immortal joys are worth aspiring after.

O thou who delightest to shower blessings on thy creatures, give me a heart that loves only what is good, a heart in which virtue and piety are enthroned. Let others attain worldly grandeur; but grant, O my God, that, content with my lot and faithful to my duty, I may approve myself worthy of the name of a man and a Christian.

THE C.J. BODLEIAN

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INFANT DEVOTION

## AUGUST 1.

### EXHORTATION TO PRAISE GOD.

BLESS the Lord, O my soul, and all that is within me bless his holy name. Bless the Lord, O my soul, and forget not all his benefits. Is he not thy Father and thy God? Is it not he who hath made thee,—who hath made thee immortal, who hath endued thee with reason, and with the faculty of knowing and praising him, thy Creator? Is it not he who formed the wonderful texture of thy frame, who composed thy body of flesh and bones, and vessels of different kinds, whose power preserveth thy breath, and keepeth all thy bones, that not one of them is broken? To God alone art thou indebted for life, health, and existence. Look back at the way by which he hath conducted thee from the moment of thy birth, and say if it be not marked with frequent monuments of his goodness.

Lift up thine eyes, O thou highly favored being! Survey the numberless blessings of every kind, which he hath already showered upon thee. At the same time direct thy view to the future: behold what faith shews thee beyond the tomb. Figure to thyself the yet unfelt transports with which thou shalt leave all afflictions and imperfections behind thee in the grave, and shalt be removed into the presence of God, thy creator and thy preserver; of Jesus, who hath procured for thee eternal bliss, who will place thee beside his throne, and make thee an everlasting partaker of his glory.

Prostrate thyself, thou child of God, thou heir of salvation! Prostrate thyself, and let all that is within thee unite in one general sentiment of the

most lively gratitude. Begin even here below the occupation of eternity! Praise the Lord, O my soul!

## *AUGUST* 2.

### PROGRESSIVE GROWTH OF CORN.

EACH stalk of corn is composed of the principal stem. It begins to be formed as soon as four green leaves appear. If the plant is then taken, and the lower leaf carefully pressed down or separated, you may generally perceive a small white spot, which in due time becomes a stalk. This little point springs from the marrow of a knot, opens into green leaves, and shoots out others from its side. All the stalks, however, that are thus produced, do not bear fruit; many of them wither and perish. When the principal stem is crowned with the ear, a considerable change takes place in the plant, and all the sap which it contains is then employed in the formation of the blossom and the fruit.

But previous to this, during the early growth of the plant, four or six leaves, which issue from as many knots, increase greatly in size. These prepare the nutritive juices of the plant for the ear, which may be seen in embryo, on splitting the plant through the middle, in spring, long before it makes its appearance. Nay, even in autumn it may be discovered in wheat, under the form of a small bunch of grapes, when the knots are yet quite close together. When the plant begins to push forth the grain, the two upper leaves of the stalk closely unite, and protect the ear till it has acquired a certain degree of strength. Till that time, all the knots, and

especially the two last, are quite soft, and very near each other. As soon, however, as the ear has burst its covering, all these parts grow longer, and the lowermost leaves transfer to them all the juices they contain. As the knots gradually become harder, those leaves decay; so that when the ear is quite exposed to view, and has almost attained its full size, they contain but very little sap, which passes into the stem, where the knots prevent its return.

When all these preparations are completed, the flower which communicates fecundity to the grain makes its appearance. This flower, or blossom, consists of a number of extremely delicate white fibres, issuing from the receptacles of the seed. These are likewise covered with various other fibres, which are at first yellowish, afterwards become brown, and turn black shortly before they wither and fall off. The principal use of these fibres is to nourish a small grain that may be perceived in the receptacle of the seed. As soon as the blossom is past, the specks containing the germ make their appearance, and these arrive at perfection long before the farinaceous matter is discernible. That matter at length begins to be formed, and gradually increases, while the sap collects round an extremely delicate particle resembling down. This substance, which continues after the blossom is over, serves, among other purposes, to keep open the great tube that passes through the cleft in the grain. The latter begins to ripen as soon as it has attained its full size. The straw and ears then become white, and the greenish color of the seed is exchanged for yellow, or dark brown. The grains, however, are still soft, and the farina contains much

moisture. When they are at length perfectly ripe, they are dry and hard.

I cannot sufficiently admire the wisdom which God has manifested in the structure and vegetation of corn. Believe me, reader, a single stalk of corn may convince you of the wisdom of your Creator, if you only accustom yourself to reflect on this kind of trifles, as they are frequently denominated. You observe that certain leaves are placed around the stem before it has attained its full growth; even these, trifling as they are, have their use and design. The wisdom of the Creator seems to have placed these leaves about the stalk, for the very same reason that an architect raises a scaffold when he is about to erect a building, and removes it when the edifice is completed: for as soon as the straw has attained its full size and strength, the leaves which supported it wither and perish. How admirable is the beauty and strength with which Nature accomplishes her purpose, even in the minutest changes! Some months elapse before the ear ventures to appear; but when all the preparations for the formation of the blossoms and fruit are completed, it bursts forth in a few days into view. The straw and ears are constructed in such a manner as to accomplish in the most perfect manner the design of the Creator. If the straws were higher, the nutritive juices would not penetrate so easily to every part of them. If they were not so high, birds and other animals would be able to reach the grain, and would commit great depredations. If the stalks were weaker, they would be broken by the wind; if they were stronger, small animals might creep up them, and birds settle on them, and peck out the grains.

O benevolent Father, may every one who be-

holds the waving corn-field admire thy wisdom and thy bounty! May every one for whom thou causest the rich harvests to ripen, pay thee that tribute of gratitude which is so justly thy due.

## *AUGUST 3.*

### THE DOG-DAYS.

THE sun, independent of his apparent diurnal motion from east to west, which produces the revolation of day and night, seems to have another motion from west to east, in consequence of which he arrives at the end of three hundred and sixty-five days at the same constellation from which he kept removing for six months, and which he again approached during the other six months of the year. Hence the ancient astronomers divided the different seasons according to the constellations which the sun enters in his annual course. This course they divided into twelve constellations, which are denominated the twelve signs of the zodiac, or the twelve houses of the sun, because he remains a month in each of them. Our summer commences when the sun enters the sign of Cancer, which happens on the 21st or 22d of June, when the sun is at the highest point of our horizon, and darts his beams perpendicularly upon us. At this period the summer heat begins, and grows more intense, the more the earth becomes heated by the sun's scorching rays. Thus July and part of August are generally the hottest portion of the year; and experience proves that the greatest degree of heat prevails between the 20th of July and the 20th of August. It happens that of all the stars with

which the sun is just then in conjunction, the dog-star is the most brilliant. This star is lost in the sun's rays, and disappears for a month, as is successively the case with all the stars at which the sun arrives in his annual revolution. This month, then, in which the dog-star cannot be seen, is the period of the dog-days.

This circumstance would be of very little importance, had it not obtained some consequence from a deep-rooted prejudice which pervades a great portion of mankind. By an ancient tradition, the heat which is generally most intense during the dog-days, is ascribed to the influence of the dog-star upon the earth. This notion appears particularly absurd, when we reflect that the occultation of the dog-star in the sun's rays does not even take place at the time we call the dog-days. Properly speaking, they do not begin till toward the end of August, and end about the 20th of September; and as the dog-star keeps continually advancing, the dog-days will in time reach the months of October and November, and will at length happen in January, so that they will take place exactly at the period of the most intense cold. From this consideration it must be obvious that the dog-star cannot possibly occasion the phenomena which we observe during the time of the greatest heat. If, therefore, in the dog-days, as they are called, wine, beer, and fermented liquors turn sour in bad cellars; if stagnant waters are dried up, and springs fail; if dogs and other animals, nay, even men are afflicted with madness, and we are subject to various maladies produced by our misconduct during the extreme heat, it is impossible that these circumstances

The dog-days.

should proceed from the occultation of the dog-star by the sun, but the sole cause of all these effects is the excessive heat of the weather at this period.

It is high time then, my brethren, to renounce a prejudice which does so little honor to the human understanding. Those who can conceive that certain figures, which the imagination has traced in the heavens, can have any influence on the earth, on the health of man, and the faculties of his mind, betray unpardonable folly. 'Tis not the stars, but ourselves, in general, who are the authors of all the evils we endure. If, therefore, fatal distempers make their appearance during these days, let us not ascribe them to the imaginary influence of the dog-star, which is a positive nonentity, but to our own inadvertence and misconduct. To consider the matter seriously, we sin against the wise providence of God, if we cherish such like prejudices. Can we suppose that a Being supremely wise and bountiful, can have produced any thing in the heavens or in the earth for the torment and misery of his creatures? Would not this amount to the same thing as believing in a blind, irresistible fatality, which cannot be admitted if we acknowledge the existence of a Creator all-bountiful and all-wise. O no; let us not be guilty of this sin, but rather believe for the glory of God and the tranquillity of our own minds, that we are under the peculiar care of a paternal providence, without whose permission not even a hair can fall from our heads.

Of the manner in which we fall asleep.

## *AUGUST* 4.

### OF THE MANNER IN WHICH WE FALL ASLEEP.

WE pass more quickly or more slowly from wakefulness to sleep, according to the state of our health and the nature of our constitution; but whether it overtakes us more or less suddenly, it takes place in one uniform manner in all people, and the previous circumstances are always the same.

The first thing that happens when we fall asleep is a stupor of the senses, which, no longer receiving external impressions, seem gradually to lose the power of performing their functions. The consequence is, that the attention diminishes, the memory becomes confused, the passions are calmed, and the train of our ideas is interrupted. While we feel the influence of sleep, we are only in the first degree of it, in a state that we call dozing. When we are actually asleep, all consciousness, even of our own existence, is suspended. The stupor of the senses is succeeded by the invincible resistance of the muscles; this is the second degree of sleep. This state produces various phenomena in the system which may be observed in a person who falls asleep in a chair. The eyes begin to open and shut of themselves, the eyelids close, the head nods, and sinks down. He endeavors to keep it steady, but it inclines still lower than before; he has not the power to raise it; the chin touches the breast; and in this position his sleep continues undisturbed. As long as the head moves to and fro, all the muscles are not relaxed. Soon afterwards succeeds a total suspension of the senses, which our will cannot prevent. When sleep has

Of the manner in which we fall asleep.

actually taken place, all the voluntary or animal functions are interrupted, but the natural or vital functions are performed with greater vigor: this is the third change which sleep produces in us. The preparation of the humors by the chyle is promoted by sleep. While we are awake, the natural functions of the body are often confounded with the voluntary, and the rapidity of the fluids is encreased in certain vessels, and diminished in others. The blood is, in some sort, expended in external actions, and consequently it cannot circulate in such abundance in the internal parts. The current of the blood is strong in those parts of our body which are in motion, and is continually propelling the humors to the secretory vessels; while in others, on the contrary, it is so weak, that the chyle can scarcely be converted into blood. A gentle sleep restores the equilibrium. The vessels are all equally distended, the fluids circulate with equal force, and the heat continues the same; in a word, nothing is lost, but every thing is employed for the benefit of the machine. Hence it is that, after a sound sleep, we feel refreshed and invigorated, cheerful and good-humored.

All these circumstances, my dear reader, are assuredly calculated to impress you with a deep conviction of the bounty of the Creator towards you. What arrangements are these to procure you the blessings of sleep! This is of itself deserving of attention, that sleep is attended with a complete suspension of the senses, and that it steals upon you unawares. The former of these circumstances renders your slumbers more sound; the latter makes it an unavoidable necessity. And what admirable wisdom of divine Providence is manifested in the

relaxation of the muscles during sleep! The first that ceases to act embraces one of our principal organs, and that which is most exposed to danger: I mean the eye. As soon as we dispose ourselves to sleep, the eyelid closes of itself, and covers the eye till we wake. In one part of the body the tension of the muscles is much greater, because their relaxation would be inconvenient, and productive of disagreeable consequences.

Let, then, the hour in which you dispose yourself to enjoy the sweet influence of sleep, be always to you a solemn hour. Your gratitude is due to your heavenly Father, not only because he preserves you from day to day, but also because he has so constituted you that sleep refreshes and imparts new vigor to your frame. Let reflections like these be the last that occupy your mind before you sink into the arms of sleep, and let them be the first that present themselves on your awaking.

## *AUGUST 5.*

### DIVISIBILITY OF MATTER.

You may easily be convinced, my dear reader, of the infinite divisibility of matter, by merely walking in a garden, and inhaling the manifold perfumes of the plants and flowers. Consider only how small must be the odoriferous particles of a carnation, which diffuse their fragrance over a whole garden. But, perhaps, this circumstance is not sufficiently striking. Let us then direct our attention to some other objects which Nature presents. Look, for example, at the thread spun by the silk-worm. If this thread is three hundred and sixty

feet long, still it will weigh but a single grain. Now reflect into how many parts a length of three hundred and sixty feet may be divided, so that all these parts shall nevertheless be distinctly discernible. According to this calculation, a single grain of silk may be divided into at least two millions, five hundred and ninety-two thousand parts, each of which is visible to the naked eye. And as these parts may be divided into many millions of others, and this division may be carried still farther in idea, it is evident that the progression may be extended to infinity. The last particles, which it is impossible for human ingenuity to divide, must still have extension, and consequently be susceptible of division, though we are unable to effect it.

If you direct your attention to the animal kingdom, you will there discover new proofs of the divisibility of matter. A great naturalist put some pepper into a glass of water; and in this water, by means of a microscope, he discovered animalculæ a thousand million times smaller than a grain of sand. How inconceivably minute, then, must be the organs of the senses, the muscles, the veins, the nerves of these creatures. And how small must be their eggs, their young ones, the vessels of these, and the fluids circulating in them! Here our faculties are bewildered; and yet these are things which actually exist, and are not merely the offspring of the imagination. The most remarkable circumstance attending this, is, that the works of Nature always appear the more regular and beautiful, the more we magnify them; whereas, with works of art it is the very reverse; for if we examine them with a microscope, we shall be astonished to find them so rude, so coarse, and so im-

perfect, though executed with the utmost skill, care, and attention.

Thus the Almighty has impressed, even upon the smallest atom, an image of his infinity. The most minute body is, nevertheless, a world, in which many millions of parts are united according to time, place, order, and effects. How consummate is that wisdom which can operate with as much regularity and perfection in the most diminutive, as in the largest objects! How infinite that power which produced from nothing such countless multitudes of beautiful forms! How unbounded the divine goodness which we discover in bodies, even though they be a million times smaller than a grain of sand! Every quality belonging to them is good and perfect. Their number, however, is so great, that no finite understanding can form any conception of it.

O Lord, and what am I? Such is the exclamation that naturally results from these reflections. The least worm, the smallest insect, the most diminutive atom may convince me that there are thousands of things belonging to it of which I am ignorant. Attempt, O man, to form a conception of the minuteness of the parts composing the body of an animal a thousand million times as small as a grain of sand. Try to determine how subtle must be the rays of light, many millions of which can pass through a hole made with the point of a needle. How soon wilt thou be bewildered, and obliged to acknowledge thine ignorance, and the narrow limits of thine understanding! How canst thou then, O mortal, be proud of thy attainments? How canst thou presume to arraign the ways of Providence, or to find fault with the arrangement

of Nature? How canst thou persuade thyself that thou art acquainted with only one millionth part of the surface of things? Here, my fellow Christian, it is thy duty, nay, it is an honor to thee to acknowledge thine ignorance, and the infinite greatness of thy Creator.

To this sublime purpose will I employ these meditations. With no other view will I reflect on the infinite divisibility of bodies, but to impress the more deeply on my mind the greatness of God and my own insignificance. In this dispensation I will also admire the wisdom of my Creator; for, this subtilty of matter enables Nature to fill up every void in the universe, without impeding the motions of bodies; a condition absolutely necessary to render the world a theatre of such multifarious changes and incessant revolutions.

## *AUGUST* 6.

### EXTERIOR STRUCTURE OF THE MEMBERS OF INSECTS.

We are too apt to consider those animals only which are remarkable for their superior bulk, as worthy of our attention. The elephant, the horse, the bull, and other large animals, seem to deserve our particular notice. And what is the consequence? While we are engaged with them, we overlook an innumerable multitude of smaller animals, which people the air, the vegetables, and the dust. How many insects we tread under our feet; how many caterpillars we destroy, and how many flies buzz around us, without exciting any other idea, than how we may most readily deprive them of life, when they happen to be troublesome to us?

But such inattention, and the conduct resulting from it, are both criminal. Let us examine the first insect that falls in our way: perhaps it may lead you to conclude that in the structure of a worm, a gnat, and other insects, the wisdom and power of our Creator are not less strikingly manifested than in the conformation of the elephant, the lion, and the horse.

The body of most insects is composed of annular divisions, which are set into one another, and participate in all the motions of the animal. The essential characteristic which distinguishes them from all the other species of animated Nature, is, that they have no bones. This part of their structure alone bespeaks the greatest wisdom. The nature of their motion, which is common to all insects; the manner in which they are obliged to seek their food; and above all, the changes which they undergo would be impeded, if their bodies had been connected by bones, instead of those flexible rings, which join and run into one another.

It is remarked in many insects that they possess the faculty of contracting or protruding their heads, of lengthening or shortening them, of concealing or exposing them to view. In other species the head always retains the same form. The mouth of these animals is in general provided with a kind of teeth, or with a trunk. This formation of the head is necessary, partly on account of the aliments on which they feed, and partly on account of the attacks to which they are exposed.

Many species of insects are destitute of the faculty of sight: but in these the want of eyes is compensated by the superior perfection of feeling, or some other sense. Insects have two kinds of

eyes. Those which are smooth and brilliant are always few in number; but those that appear full of grains, like shagreen, amount, in general, to many thousands. Neither the one nor the other are moveable, but probably their multiplicity makes partial amends for the want of motion. The antennæ, or horns, with which most insects are provided, are of extraordinary utility to them in their way of life. By means of these appendages they not only receive intimation of the approach of danger, but discover the aliments adapted to their nature.

The legs of insects are either scaly or membranous. The former move by means of several joints; but the latter, which are softer, move in all directions. Both these kinds are sometimes found in the same insect. Many have several hundreds of legs, and yet they walk no faster than others which have only four. With respect to this part of the body of insects, there is an infinite diversity. How curiously are the feet of those constructed which can fasten on smooth substances! How elastic are the legs of those which leap, and how strong the same members in such as burrow in the ground!

To the middle of the body are attached the wings, two or four in number. Some are of a transparent texture, and others are covered with scales; these are inclosed in a case, and those are destitute of this protection. On the sides, or at the extremities of the body are orifices resembling the pupil of the eye, which are the organs of respiration.

The diversity of structure and conformation among the insect tribes far transcends the limits of

human comprehension. The lives of many men, if they were to attend to nothing else, would not be sufficient merely to observe and describe the different figures of their bodies. How various are the forms of the insects which walk, fly, hop, leap, and crawl! Let these forms be what they will, the most exact symmetry and the most perfect proportion are nevertheless preserved. He who could forbear admiring the wisdom displayed by the Creator in this portion of his works, would betray either a weak head or a bad heart; for those alone are intelligent and virtuous who discover and adore him in all the productions and incidents of Nature. Whenever we behold an insect, let us, therefore, fulfil these sacred duties. Let us study, as much as possible, the wonders of its structure and conformation, that we may be duly impressed with the greatness of the Most High.

## *AUGUST 7.*

### COMPARISON BETWEEN THE SENSES OF MAN AND THOSE OF BRUTES.

HAVE any animals more perfect senses than man? This is a question which cannot be answered in the affirmative, except in particular cases, but a general consideration of the subject must establish the reverse of the proposition. It is said, that the spider has a finer feeling; that the vulture, the bee, and the dog have a keener smell. We know that by means of this sense the hound scents his game over the surface of the earth, and that there are even dogs which discover vegetable productions buried in the ground. We daily observe

Comparison between the senses of man and brutes.

the hog, guided by his smell, digging up the earth with his snout. The hearing of stags is said to be so acute that they can hear the sound of bells at the distance of many miles; and the mole, burrowing under the earth, hears better than man, who dwells upon its surface. With regard to sight, man is greatly surpassed by the eagle among birds, and the lynx among quadrupeds. All this must certainly be admitted; but if we institute a comparison in this particular between the whole family of animals and the whole race of man, we shall be struck with the superiority which almost all the individuals of the latter enjoy over an innumerable multitude of animals. Man is naturally endued with five senses; an advantage which scarcely one half of the animal tribes possess. The zoophytes, which form the boundary between the animal and vegetable kingdoms, have only one sense, which we call feeling. Many animals have but two, and others only three senses. Those which are endued with five are considered as the most perfect of animals.

But even the most perfect animals have not always more acute senses than we. There are numerous instances of men who have possessed one or the other sense in the highest degree of perfection. Among the Indians there are persons who can discover the purity of the precious metals by the smell with greater certainty than by the touch-stone. It is related of others, that they can discover at a very great distance the retreat of a wild beast. The negroes in the West India islands will, we are told, distinguish by the smell whether a European or a black has passed before them along the road. The weakness of the intellectual faculties of the savage

render it necessary that his senses should be more acute. There are many people who by exercise have improved certain senses in a higher degree than others. And if man, like animals, had no other dependence for procuring food and avoiding dangers than his senses, if reason were not given him as a much surer guide, he would certainly have found means to bring his senses by practice to the highest degree of perfection of which they are susceptible. But man has no occasion for more acute senses than he actually possesses. Reason abundantly compensates him for the superior excellence of the senses of certain animals; nay, we may even assert with confidence, that, if our senses were more refined, that very circumstance would subject us to great inconveniencies. Let us take the sense of hearing in illustration of this position. If this sense were as acute in us as the safety of some animals requires it to be in them, we should be alarmed by the most distant noise; and a stunning medley of confused sounds would incessantly interrupt our reflections, our repose, and our most noble and useful occupations.

Thanks be to the infinite wisdom of the Creator, who hath endued us with such a degree of sensitive perfection, as enables us fully to enjoy the blessings of Nature, without interrupting the sublime occupations of the human understanding. To us an inferior degree of sense is an advantage rather than a loss, a perfection rather than a defect. Happy are they who resign the government of the senses to reason, and who enjoy in their fullest extent the advantages resulting from their union!

## AUGUST 8.

### THUNDER.

THE thunder rolls! Who is it, O mortal, that causes this tremendous uproar? Who launches the lightning from the bosom of the clouds? Look, O sinner, 'tis the Lord of the universe, 'tis the arm of the Most High.

Nature reposes in his hand; he preserves and blesses her; but he speaks, and at his word the heavens and the earth are consumed by flames of fire—the heavens and the earth are no more.

Again the thunder peals! How tremendous is the face of heaven involved in storms! Again the lightning flashes! How great art thou, O God! and how vast is thy power!

From his everlasting throne God casts upon us a look of wrath; and by the lightning's vivid glare we behold the grave opening under our feet.

When the Lord rideth upon the clouds, the hero trembles; when he wieldeth the sword of his wrath, the universe turns pale.

God thunders, and the sinner quakes for fear; scarcely does he venture to raise his eyes toward him, who seems to address him in such threatening accents.

O Christian, let not the majesty of the God of heaven strike terror into thy soul, when, seated on the tempestuous clouds, he launcheth his lightnings around him.

When the awful crash of the pealing thunder appals the wicked, thy God watches over thee, and protects thee from all harm.

And though it be his pleasure to take away thy life, all his dispensations are just; he is thy Maker, and thou shouldst address him: Lord, my soul is at ease; whether I live or die all my hope is in thee.

That Being who directs the thunder is the friend of the Christian; and if he thinks fit to snatch me from the land of the living, I know that his intentions towards me are gracious, and that he will transport me to the regions of everlasting felicity.

He who, when the heavens are serene, glorifies his God with songs of praise and thanksgiving, is also calm and composed when the sinner hides himself from the impending storm.

But whither can the sinner flee? How can he escape the penetrating eye of the Eternal? Vain are his attempts to conceal himself; the lightning pursues, and smites him in his dark retreat.

Think not then of escaping, O sinner; renounce thy delusive dreams, nor indulge the idea that thou canst hide thyself from thy Creator, who follows thee every where, and can overtake thee any moment he pleases.

While the thunder roars, thou tremblest and beatest thy breast with many a sigh; but no sooner has the tempest ceased, than thou again pursuest factitious pleasures.

Sinner, if thou wouldst obtain mercy, bless the Lord for the favor which he shews thee. Forget not the vows made by thee in the hour of thy distress, and remember that God cannot be mocked.

God is merciful; he spares the rebellious, but he will not spare for ever. The Eternal is just, and the supreme judge will summon the sinner to appear before his tribunal. What is the thunder which rolls above our heads in comparison of that awful

day, when we shall hear the tremendous roaring of the tempest, when the elements shall be dissolved with the same fervent heat which shall consume the earth, and all that it contains.

## *AUGUST* 8.*

### SUPERSTITIOUS NOTIONS RESPECTING DIFFERENT ANIMALS.

IT is scarcely possible to conceive that there should still exist people, over whom superstition exercises so much power as to persuade them that the most beneficent of Beings is a tyrant, and that his creatures are destined only to be the scourges of mankind. Modern times afford, nevertheless, abundant instances of these ridiculous notions.

In Norway, when the mice increase in an extraordinary degree, the inhabitants hold what they denominate the Festival of Mice, which consists in putting on their holiday apparel, and lying down and sleeping, instead of going to work. On the appearance of a particular species of worm, the people lay their clothes in its way, and regard it as a fortunate sign if this army, composed of millions of maggots, united by a slime which exudes from their bodies, crawls over them; but if they turn aside from them it is a bad omen.

A curious kind of moth, called the death's-head, is still considered, in countries that are still involved in superstition, as a forerunner of great mortality among men and cattle, on account of the figure resembling a death's head, which is seen upon his back.

Superstitious notions respecting different animals.

What calamities have been prophesied from the gall-apples which grow on the leaves of the oak! It has been found that they always contain a small worm, a spider, or a fly. As each of these insects must necessarily forebode a peculiar calamity, the worm has been regarded as the precursor of dearth, the spider of infectious diseases, and the fly of impending wars.

The noise resembling the ticking of a watch, which we sometimes hear in the wall, is, with the lower classes of the people, an infallible sign of death; hence it is called by them the death-watch. On a closer investigation of this phenomenon, we find that this noise proceeds from a species of louse, and that these pulsations are the means by which the female invites the company of the male.*

These examples, the number of which might be greatly augmented, may serve to convince the superstitious how often mankind are mistaken in their opinion of natural objects, and how long they have tormented themselves by these erroneous notions. Let us study, reader, to extend more and more our knowledge of Nature; let us look up with increased confidence to God, who has not created any thing for the affliction of man, and impress more deeply upon our minds this conviction, that whatever ex-

* There are, in fact, two kinds of death-watches, one a small beetle about one third of an inch long, and the other a small greyish insect resembling a louse. The former beats only seven or eight strokes at a time, and quicker; but the latter, whose strokes are more leisurely, will beat some hours together without intermission. T.

ists in the heavens or on the earth, however pernicious it may appear, is nevertheless contrived for the best and wisest of purposes.

## *AUGUST 9.*

### CONTEMPLATIONS AMONG THE GRASS.

THOU black, towering pine wood, whose perpendicular columns rise thick and high amid thy dark shades; ye lofty oaks, and thou, stream, that pourest thy dazzling, silvery current behind yon grey mountains; it is not you that I now wish to contemplate: to the grass around me my observation is now confined. I will survey this wonderful world in miniature, replete with an infinite variety of beauties, with innumerable species of plants, with millions of different inhabitants, which partly fly from flower to flower, and partly wander among the mazes of the grass. Infinitely diversified in form and beauty, each here finds subsistence and pleasures; fellow-citizens of the earth, each in its kind perfect and good. How softly dost thou murmur past me, little stream, through the water-cresses and the purslain that spreads over thy surface its azure flowers; thou encirclest each of their stems with a small, sparkling ring, and shakest their tender blossoms. On either bank the luxuriant grass is intermingled with flowers; they bend over the tide, and thy limpid current flows beneath the variegated arch, and reflects their beauteous hues. I will now look through the little thicket of waving grass; how beautiful appear the various tints of green in the sun-beams! How they throw flitting shadows over each other! Tender plants, with va-

rious kinds of leaves, creep among the herbage, or rear their waving blossoms above it. But thou, azure violet, emblem of wisdom, hidest thy modest head, diffusing thy perfumes around, while scentless flowers lift their blossoms high above the grass, and wave proudly in the breeze. Winged insects pursue each other on the turf; my eye now loses them in the verdant shade; and now again they sport in the sun-shine; or, flying upwards in swarms, dance aloft in the glistening air.

What variegated flower waves yonder over the stream, decked with such bright, such beauteous tints? But no; what a pleasing deception! 'Twas a butterfly, which has flown away, and left the slender, trembling blade behind. What insect rushes past me, armed with black scales, on red, glistening wings, and settles, perhaps beside his mate, on yon blue-bell? Flow gently, thou murmuring stream! Wave not the grass or the flowers, ye zephyrs; methought I heard the sounds of the softest music. Yes, they sing; but our ears are too gross to catch the delicate tones, as our eyes are too dull to perceive the minute parts of their forms. What pleasing murmur do I hear around me? Why do the flowers thus bend their heads? It is a swarm of little bees, which joyfully issued from their distant habitation, dispersing themselving over the meadows and gardens. With cautious industry they selected the yellow spoils, which they are bearing back, each animated with equal zeal for the welfare of their little commonwealth, where indolence is unknown. They fly about from flower to flower, and hide their hairy heads in the cups of the blossoms, or with difficulty force their way into the yet unexpanded buds, which, closing again upon them, con-

ceal the little robbers that plunder them of treasures which they would not, perhaps, have unfolded till the morrow to the rising sun-beams and the glistening dew.

Yonder on the tall clover blossom settles a little butterfly; he waves his variegated wings of glittering silver, marked with small purple spots; their gold border is insensibly blended with a tint of green. There sits the gaudy insect, and arranges the plume of silver feathers on his diminutive head. Bend the flower over the stream, beautiful butterfly, and contemplate thine image; then wilt thou resemble the fair Belinda, who, as she gazes on her mirror, forgets that she should be something superior to a butterfly; her robes are not so splendid as thy wings, but she is thoughtless as thou.

What wanton sport are ye beginning, little zephyrs? They flutter in pursuit of each other through the grass; as a gentle breeze drives before it the waves of the lake, so they bow the rustling herbage. Its little party-colored inhabitants fly aloft, and look down upon the confusion: the zephyrs again repose, and the peaceful grass and the flowers invite their return.

But where shall I conceal myself? Cover me, ye flowers! Yonder comes the young Hyacinthus in his splendid, embroidered clothes: he hastens whistling over the humble turf. In vain Nature may smile; to him her beauties are too stale. He is hurrying to the gaming-table, where his dress will have more charms for the company assembled round it, than the glowing tints of eve. How he would laugh, were he to see me reclined, far from the fashionable assembly, among the insects in the grass! But excuse me, Hyacinthus, if I gaze not

on your haughty gait and your splendid dress; for here, on this blade of grass, crawls an insect, whose wings of green and gold exhibit all the brilliant and varying tints of the rainbow. Forgive me, Hyacinthus, and forgive Nature, who has bestowed on a fly a more beautiful dress than human art is capable of producing.

O how fair art thou, Nature, how beauteous in thy smallest works! The purest pleasures are renounced by him, who lives regardless of thy charms; whose mind, enslaved by furious passions, corrupted by false joys, is unsusceptible of that bliss which thou affordest. Happy is he, whose soul, free from remorse, unclouded by care, is alive to every impression of thy beauty. The scenes which others pass with insensibility and disdain, are to him replete with pleasures; to him all Nature appears arrayed in charms; his senses are continually discovering inexhaustible sources of gratification in every path in which he walks, in every shade beneath which he reposes. For him soft raptures spring from every stream; they mingle with the perfumes of every flower, with the melody and the murmur of every bush. No satiety destroys the ever new pleasures which the endless variety of Nature's beauties affords. Infinitely diversified and inexpressibly beautiful, even in her minutest works, she has exquisitely fitted every object, in all its relations, for the purposes for which it was designed. Happy, thrice happy he, who derives his pleasures from this inexhaustible source; his mind is serene as the fairest day of spring; his sensations are soft and pure as the zephyrs which waft around him the perfumes of the flowers.*

* This little piece is borrowed *verbatim* from the amiable

## *AUGUST* 10.

### OF THE MISCHIEFS CAUSED BY ANIMALS.

It is a pity that so many, and often the fairest productions of Nature, are exposed to the ravages of animals. What havoc is made every summer, and especially in the vegetable kingdom, by the voracity of various species of animals! How many trees are stripped, and what quantities of fruit are consumed by the worms, caterpillars, and flies. Of how much of our sustenance are we deprived by the insatiable sparrow, and the no less greedy crow! How dreary is the appearance of a field laid waste by rats and grasshoppers!

These and other such-like complaints are frequently repeated by men, who seem to imagine that certain animals were created only to injure and torment them. It must, indeed, be admitted, that there is some foundation for them, and we should contradict the evidence of our senses were we to deny that certain animals are prejudicial both to men and vegetables; and that the insects, in particular, commit very great depredations. Wolves, lions, and other wild beasts may be more easily exterminated than insects, when they overrun a country in great numbers. In Peru, a species of ant called

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Gessner. Though it is introduced by Sturm nearly in the words of the original, yet, he has taken the liberty of making certain omissions and deviations, which (in my opinion, at least) cannot be considered as improvements. I have therefore ventured to restore it to the form which it received from its author, and have transcribed it from my version of Gessner's Works, vol. ii. p. 210. T.

*chako*, or the travelling ant, is a real plague to the inhabitants. When they receive a visit from these insects they are obliged to leave their house, and their lives would be endangered if they did not use the precaution to get out of the way.* Every body knows what devastations are made by caterpillars on our fruit-trees, and by mice in our fields.

All these inconveniencies, however, are not sufficient to justify such bitter complaints, in most of which personal interest has too large a share. We are pleased to see animals that are injurious to us destroyed by others; we think it no injustice to kill animals, either for food or other purposes; but we cannot calmly suffer them to take any thing from us; we make them contribute to our support, but are unwilling to furnish them with any portion of their subsistence. Have we a better right to take away the life of a gnat, than it has to make free with a drop of our blood for its sustenance. Amid our continual complaints of the mischiefs occasion-

* It would appear, from the accounts of various naturalists, that these insects are neither so destructive nor so formidable to man as the author represents them. M. Valmont de Bomare informs us, that they march in large armies, exterminating the rats, mice, and other noxious animals. When the inhabitants perceive these visitors approaching, they open their chests, boxes, and drawers, that they may rid them of those animals, by which they are exceedingly infested. From the utility of their services they are never unwelcome guests; on the contrary, their visits are so acceptable, that the people of the countries where they are found wish them to be repeated more frequently than they are, an interval of three years sometimes elapsing between them. When, however, these insects are irritated by men, they attack the shoes and stockings of the offenders, and presently tear them in pieces. T:

ed by animals, we never reflect that this arrangement of Nature is far less disadvantageous than it appears. It is highly necessary that Nature should be suffered to operate in conjunction with the animal tribes, and it would be a very dangerous experiment to endeavor to extirpate certain species, which we regard as pernicious, though, in fact, they perform very important services. Some years ago, the inhabitants of the then English colonies in America resolved to exterminate all the jays, from an idea that those birds committed great depredations among the corn. This plan was put in execution; but in proportion as the number of jays diminished, prodigious numbers of worms, caterpillars, flies, and various species of the scarabeus began to ravage the corn-fields. At length the persecution of the jays ceased, and their numbers again increasing, put an end to the plague which was the consequence of their destruction. Some time since a similar attempt to exterminate the crows was made in Sweden; but the inhabitants were at length convinced that these animals did not merely make free with corn and plants, but were busily engaged in seeking the worms and caterpillars, with which the foliage and the roots are infested. The people of North America endeavored with equal diligence to destroy the sparrows; but the consequence was, that in the marshy countries a certain species of gnat increased to such a degree as to compel them to abandon whole tracts of cultivated land. The island of Procida affords such excellent sport from the number of pheasants it contains, that the king of Naples was induced to prohibit the inhabitants to keep cats in their houses. In a few years the rats and mice increased to such a

pitch as to occasion universal devastation; on which the decree against the cats was repealed.

And why should we be so selfish as to grudge the animals a small portion of our provision for their subsistence? Could we consume every thing if we were not assisted by the animals? Do we find any deficiency in our sustenance or our pleasures, because the birds, the mice, the insects, and worms partake with us of the blessings which God hath bestowed in such abundance, that much would be wasted and spoiled were they not to make use of it? Let us then, instead of complaining, acknowledge even in this dispensation the wisdom of our Creator. Every thing in the vast empire of Nature forms a necessary portion of the general plan. Not a creature has been made without object or design, though we are ignorant of the destination of so many animals. Their existence alone should convince us that they have been created for wise purposes. Let us, then, on beholding the apparent disorders and imperfections of Nature, look up to God, who has created nothing in vain, who preserves nothing without reason, and permits nothing to be destroyed without some useful design. If we acquire a thorough conviction of these truths, we shall give him praise and honor for all his works.

## *AUGUST* 11.

### DIVERSITY OF COLORS.

WHEN I consider how dull the gardens and fields would be if one uniform color pervaded them, I discover also in this particular the wisdom and goodness of God, who has diversified our pleasures

Diversity of colors.

by creating so great a variety of colors. Had he not designed to place us in an agreeable abode, why should he have embellished every part of the earth with the most pleasing diversity of exquisitely beautiful tints? The sky and all the distant objects are painted on a grand scale, the principal characters of which are majesty, sublimity, and magnificence. In a leaf, a bird, a flower, which we have an opportunity of contemplating more closely, we discover all the delicacy and elegance of a miniature.

But whence proceeds the diversity of colors? Each ray of light appears simple and homogeneous, but by refraction it may be divided into several, and hence arises the difference of colors. A glass filled with water, and placed in the sun, reflects certain colors upon white paper; but those reflected by glass that has been cut and polished are still more vivid. We may produce the most beautiful rainbow by holding a prism, or triangular glass, towards the sun, or receiving upon it a ray of light, entering through a small hole into a dark chamber. As the refraction of the rays is more or less strong, the colors will be more or less vivid. The upper and most refrangible ray is the violet, which must consequently be the weakest; next to it comes the indigo, then blue, green, yellow, orange, and lastly, a lively red. The nature of bodies, however, contributes greatly to the diversity of colors. The smallest atoms or particles of most bodies are transparent; hence they refract, absorb, or reflect the sun's rays, sometimes one way and sometimes another, like small prisms. What proves that the colors are not inherent in bodies, is, that the feathers of pigeons and peacocks, taffeta, and other silk stuffs, change their color according to the light

Diversity of colors.

in which they are held. This may enable us to judge whence the diversity of colors proceeds. It is nothing more than this, that the surface of bodies is composed of extremely delicate laminæ, which reflect various kinds of colored rays, according to their different substance and thickness, at the same time that they admit and absorb others. When, therefore, a body with a smooth surface reflects almost all the rays of light which it receives, it appears white; and on the contrary, it looks black when it absorbs the greater part of them.

What reason have we to admire the goodness and wisdom of our great Creator! Had he not so constituted the light that its rays could be separated, and assume different colors, every thing would have appeared of one uniform hue. We should not have been able to distinguish many objects, otherwise than by reasoning, or by the circumstances of time and place: but to what embarrassments should we be exposed, if we had no other means of distinguishing things but by the deductions of reason! Our whole lives would be spent in investigating rather than in acting, and our numerous mistakes would involve us in continual uncertainty. Had the earth exhibited but one color, our eyes would soon have been fatigued, and the everlasting uniformity would have produced disgust rather than have afforded pleasure. But since God has created such a diversity of colors, this tends, not only to diffuse more beauty over the earth, but likewise procures us delights ever varying and ever new. Hence we perceive that, in the formation of the world, God did not confine his regard to the essential perfections of his works, but that he forgot no species of embellishment consistent with their uti-

lity. Agreeably to this wise law he has also constituted the surface of our globe. Beauty is every where combined with utility in the most manifold variety of hues and shades. Whithersoever we turn our eyes we discover new charms in the flowery meads, in the vallies, and upon the mountains. Every object tends to enhance our gratification, and for this, reader, thy Creator deserves thy unfeigned gratitude and praise.

## AUGUST 12.

### HABITATIONS OF THE BEAVERS.

WERE a man who has never heard of the skill of the beaver, to be shewn the edifices which they construct, he would doubtless imagine that they had been planned and executed by a number of expert architects. The works of these animals are truly astonishing. The judicious plan, the dimensions, the solidity, and extraordinary art displayed in their buildings, cannot fail to excite amazement in every attentive observer.

The beavers fix their habitation in a place where there is a plentiful supply of provisions, and situated near a stream, in which they can form a reservoir for bathing. They begin by constructing a dam; on this they build their habitation, the ground-floor of which is level with the water. This dam is sometimes a prodigious work. It is ten or twelve feet thick at the base, but is made sloping, and gradually diminishes in thickness, so that at the top it is not more than two feet broad. The materials of which it is composed are wood and clay. The beavers cut down stakes as thick as a man's

arm, with astonishing facility. These they fix perpendicularly in the bed of the river, very near to each other, and fill up the interstices with smaller branches. But as the water would still run through, and leave their reservoir empty, they make use of clay, which they find without any difficulty, to plaster the work, both within and without, and thus prevent the water from flowing off. This dam or dyke is sometimes eighty or a hundred feet in length.

After the dyke is completed they fall to work upon their habitations, which are circular or oval buildings, composed of three different apartments one over the other. One of them, which is generally below the level of the dam, is mostly full of water; but the two others are above it. These little edifices they construct with great solidity on the brink of their lake, and always in stories, that if the water should rise they may be able to ascend above it. If they find a small island near their watering-place, they build their habitation upon it; in this case it is much more durable, and the animals are not exposed to so many inconveniencies from the water, in which they cannot remain for any length of time. But if they cannot meet with this advantage, they force poles into the earth by means of their teeth, to protect their edifice against the violence of the wind and water. At the bottom they leave two apertures toward the water; one conducts to the place where they bathe, and the other is the avenue through which they convey whatever would soil their upper apartments. Higher up they have a third door, for an outlet when the lower ones are blocked with ice. Sometimes they build their houses entirely on dry land, and dig

Habitations of the beavers.

trenches five or six feet deep, down to the water. For these edifices they employ the same materials as for their dams, and display the same ingenuity in their construction. The walls are perpendicular, and two feet thick. With their teeth they cut off the ends of the branches that project farther than the wall, and then mix clay and grass, with which composition they plaster the walls both within and without. The interior of the habitation is arched, and the dimensions are proportioned to the number of its inhabitants. A space twelve feet long, and from eight to ten broad, is sufficient for eight or ten beavers. If their number is greater, they enlarge the building accordingly.

The only tools which the beaver possesses are four strong incisive teeth; the two fore-feet, the toes of which are separated, and provided with long, sharp nails; the two hinder feet, which are webbed; and a scaly tail, resembling a long trowel. With these tools they put to shame our masons and carpenters, with all their trowels, squares, and axes. With their teeth they cut down wood for their habitation and sustenance; their fore-feet they employ in digging and preparing clay; while the tail serves the purpose of a wheelbarrow or hod, for the conveyance of mortar, and afterwards that of a trowel to plaster their houses.

The operations of the beaver appear to have a considerable resemblance to the works of man; and to judge from the first impression they are apt to make, they might even be regarded as the result of reflection. On a closer examination, we shall, however, find, that in their actions these animals are not governed by reason, but by an instinct which Nature has implanted in them. If they were

capable of reflection, the edifices they now build would be very different from those which they formerly constructed; they would be continually making improvements. We observe, on the contrary, that one generation invariably treads in the steps of the preceding, and that they never deviate from the circle which Nature has assigned them; so that the beavers of the present day build exactly in the same manner as those which lived immediately after the deluge. They are, nevertheless, astonishing creatures; and of all the gregarious animals they approach nearest to human reason. The mere consideration of them is sufficient to convince us that animals are not machines, but that all their actions and motions are governed by an intelligent principle. But how different are the faculties with which the Creator hath endued them! How far superior is the intelligence of the beaver to that of the sheep! And what divine wisdom is manifested in the gradations of animal instinct! May we be excited by the knowledge we acquire of animals, to extol the wisdom and goodness of our common Creator!

## *AUGUST* 13.

### OF THE NUTRITION OF THE HUMAN BODY.

ALIMENTARY substances are composed of two different kinds of particles; those which remain in the body for its nourishment, and such as must be expelled. For both these ends it is necessary that the food should be divided into small parts, and dissolved. The first part of this operation is performed in the mouth. The fore teeth, or incisors,

cnt it in pieces; these are torn by the canine, or eye teeth, and ground small by the double teeth. The tongue and lips likewise assist to keep the aliments between the teeth as long as is necessary. By the pressure of certain glands in mastication, the saliva is conveyed to the food in the mouth, in order to soften it and facilitate digestion; hence it is of considerable consequence that food should be sufficiently chewed before it is swallowed.

The food thus comminuted, and in some sort dissolved, passes out of the mouth into the throat, which is likewise kept continually lubricated by the secretions from the glands. When it is too dry, the sensation of thirst intimates the necessity of drinking. After passing through the gullet, the food is received into the stomach, in which is secreted a fluid called the gastric juice, by whose action the process of digestion is effected. When the stomach has been too long empty, the gastric juice, stimulating its nervous coat, produces the sensation which we call hunger. The stomach is in continual motion, so that sometimes it is longer or broader than at others. The aliment, however, is prevented from returning into the gullet, by a valve placed at the upper orifice of the stomach, which closes when the half digested food is propelled upwards, so that it is obliged to pass through the pylorus into the intestines.

The intestines might be termed a prolongation of the stomach. This canal is subject to a constant motion, called the peristaltic motion, by which the whole alimentary mass is completely agitated. Reduced to a pulp, it remains a considerable time in the intestines, and passes through them very slowly. Here a new fluid, called the bile, is con-

veyed to it by a particular duct. It flows from the gall-bladder, and is prepared in the liver, and perhaps, also, with the aid of the spleen, and contributes to the farther dissolution of the aliments. In each of the intestines are the orifices of extremely delicate vessels, called lacteals. The purest and whitest part of the alimentary substance is continually passing through these vessels, which convey it into a larger tube. In this it is propelled upward to the chest, and discharges itself into the veins; where, by its commixture with the blood and other juices, it exchanges its white color for red.

After the separation of the chyle, nothing but the excrementitious part is left. This passes from the intestine called the cæcum, into the rectum, and there accumulates till it produces the action of the organs which occasions its expulsion. The intestines are fastened to the mesentery, and are kept sufficiently extended, so as not to become entangled with each other. All the viscera of the abdomen are inclosed in a fatty membrane, called the peritoneum. As the intestines furnish chyle, so whatever is necessary for the preservation of the body is secreted in the veins and glands. These fluids are conducted by very fine vessels to the place of their destination, and all that is superfluous or pernicious is carried off through other channels. If any thing of an injurious nature has obtained admission into the body, an extraordinary movement soon takes place in the system, which is sometimes succeeded by ulcers, copious perspiration, and other evacuations, which may be assisted by medicine, for the preservation of health.

You see, reader, how many operations are necessary for the satisfaction of the daily wants of

your body. How many parts and organs must operate in unison that your body may be nourished and preserved! So intimate is the connection between the internal and external parts of your body, that by means of it the digestion of food, and the secretion of the various fluids and humors are carried on. The most extraordinary circumstance is, that all the functions which the body performs for the purpose of nutrition, tend, at the same time, to several other ends. The tongue contributes to the nourishment of the body, but it is, likewise, time, the organ of speech and taste. The organs by which the acrid and superfluous humors pass away from the body, serve also for the propagation of the species. There is not a member of our body but what was made for more than one use; and this is a striking proof of the infinite wisdom of our Creator. Reflect on this during your repasts, and let it also be sometimes the topic of your conversation. It will afford you a copious and useful subject of investigation, and you will thereby fulfil the injunction of the apostle:—Whether ye eat or drink, or whatever ye do, do all to the glory of God.

## *AUGUST* 14.

### CONSIDERATION OF NATURE IN VARIOUS POINTS OF VIEW.

THE works of Nature far surpass all the productions of art in this circumstance, that by their astonishing diversity they are continually affording fresh subjects for pleasure and wonder. We contemplate a work of art once or twice; but if we behold it often, we become weary of seeing it, and

a certain indifference gradually insinuates itself into the soul. If, on the contrary, we examine the works of Nature with ever so much attention, the mind is never cloyed, but it is led to new contemplations, in which it may more easily be lost than fatigued.

Consider the majesty and the sublimity of Nature. With what astonishment are you struck when you survey the boundless expanse of the heavens, the innumerable multitude of the stars, and the prodigious extent of the ocean! Compare with these all the works of art, however grand and magnificent. How insignificant, how contemptible must they appear! Every thing that God has created bears the impression of a grandeur far surpassing all that human imagination can conceive, or human ingenuity imitate. To give us an idea of his infinity, he had only to form the sky, which manifests, in a much more striking manner, the glory and majesty of the Creator, than any thing which the earth contains. What is so calculated to excite sentiments of profound veneration for God, as to contemplate him in these mighty works? With what holy awe of his majesty must you be filled, when you behold the great phenomena of Nature, which no man is able to produce; such as earthquakes, volcanoes, inundations, storms, and tempests! These grand scenes of Nature are, from time to time, presented to your view, and each of them is capable of forcibly impressing your mind with the greatness and majesty of the Creator of heaven and earth.

Nature likewise presents herself to you in a more pleasing point of view. You behold vallies clothed with verdure, and decked with beauteous flowers,

corn-fields affording the promise of an abundant harvest; hills covered with woods, vines, and herbage; rivers and brooks which supply you with fish for food. In all these scenes God appears as the friend and benefactor of men, who every where openeth his bountiful hand, and satisfieth the wants of every living creature. This is the season in which all Nature affords striking demonstrations of his goodness. Every thing conspires to delight your senses, and conduces at once to your pleasure and preservation.

But the season approaches in which Nature will assume a dreary aspect. She will soon lose a great portion of her variety and beauty, and resemble a desart, which promises neither plenty nor pleasure. Each day brings us nearer to that gloomy period, and the gradual decrease of the days prepares us for the approach of that season, which shall confine us to our habitations; but Nature ought to please, even under this form; for winter concurs in the perfection of the creation, and without it we should be deprived of the pleasures of spring and summer.

Apply these reflections, my dear reader, to your own life. It is equally liable to variations and vicissitudes. To the most happy and delightful scenes, often succeed the most gloomy and afflicting. Let us, then, in prosperity prepare ourselves for adversity, and praise our Creator for every dispensation.

Of the mischiefs which rain sometimes occasions.

## *AUGUST* 15.

### OF THE MISCHIEFS WHICH RAIN SOMETIMES OCCASIONS.

A MODERATE quantity of rain always contributes to the growth and fecundity of vegetables, and is consequently an inestimable benefit to the earth; but when it falls with too great violence, or continues too long, it may prove injurious in many respects to vegetation. When too vehement it beats down the tender plants, and its too long duration prevents their growth. The excessive humidity occasioned by too much rain, deprives them of the necessary degree of warmth; the circulation of the sap is obstructed, the secretions are not duly performed, the plants languish, and are in danger of perishing.

This however, is not the only way in which rain may be prejudicial, though it is the most common. It makes now and then tremendous havoc on the earth. It happens sometimes that a multitude of clouds or vapors, driven by impetuous winds, strike in their course against lofty edifices, mountains, and other elevated objects, break, and suddenly pour forth in torrents the waters with which they were charged. This phenomenon cannot but be attended with the most calamitous effects, the water precipitating itself with great violence from the mountains and hills. It is not astonishing, then, that it should at such times carry along prodigious stones, uproot large trees, and even overthrow buildings in its course. Two circumstances here concur to augment the power of the torrent. Not only the vast quantity of water that is discharged, but the increase of its velocity by the height from which it

is precipitated, tends to aggravate its effects; for the greater is the mass and velocity with which a body moves, so much the more powerful is its action.

Water-spouts are still more dangerous and destructive. In figure they resemble a column, or an inverted cone, whose point is turned toward the earth, and whose base terminates in some passing cloud. With tremendous force they draw up into the air all objects which they meet with in their course, and then plunge them into the abyss. These water-spouts are most common at sea, where they do much mischief. The point of the cone touches the sea, the compressed water ascends foaming, and with a terrible noise, into the air, and, if it encounters ships or buildings, it shatters the latter, and frequently sinks the former.

The sudden bursting of clouds and water-spouts is always dangerous. Fortunately the latter very seldom occur on land. Mountainous regions are more exposed to the breaking of clouds than level tracts; and God has set limits to the devastation occasioned by this phenomenon, so that it rarely occurs, and many years often pass away before a few acres of ground are laid waste by it. It is therefore highly unjust, when these calamities take place, to murmur against God, and to give way to unbecoming doubts. These events commonly make so profound an impression on the multitude, that they generally view them through a false medium, which multiplies and magnifies the ills of Nature. If a tract, which is but a point in comparison with the globe, be laid waste by the bursting of a cloud, or any other accident, we make as bitter complaints as though all Nature were on the eve of de-

struction. Our whole attention is engaged by these local disasters, so that we forget the benefits which God confers on us, and which are far more universally diffused than the judgments with which he is pleased to visit the earth. The general order and happiness arising from the actual arrangement of Nature, ought, by right, to be the objects of our admiration and attention, and not the particular calamities, which should be regarded as deviations from the ordinary course of things. Would it not be equally absurd and ungrateful to take notice only of devastating tempests, earthquakes, storms, and inundations, which perhaps occur but once in several years; and to pay no attention to the innumerable benefits resulting from the vicissitudes of the seasons, and the services of the elements? Should we not sin against God, were we merely to calculate the mischiefs occasioned by accidental evils, and to overlook the manifold advantages which we daily derive from the wise arrangement of Nature?

Let us not incur the guilt of ingratitude, so culpable and so irrational, but rather seek with humility to contemplate the works of God, and to obtain just and proper notions of them. For infinite intelligence, beauty, and goodness most assuredly pervade even those objects in which we can discover scarcely any traces of them; but they will be gradually disclosed to our view, if we apply ourselves with an attentive mind and a religious spirit to the study of Nature.

## *AUGUST* 16.

### CARE OF ANIMALS FOR THEIR YOUNG.

ONE of the most remarkable instincts which God has implanted in animals, is undoubtedly that which they manifest in regard to the preservation of their young. We find scarcely any creature that abandons its eggs or its young to blind chance. Their self-love is transferred to their progeny, and operates in the way that is best adapted to the wants and mode of life of each. The young of some animals, such as those which are hatched from the eggs of fishes and insects, have no need of incubation, because the warmth of the sun is sufficient to vivify them, and immediately after their birth they are capable of providing for themselves, if they come into the world in a suitable place, and have provisions within their reach. The greater part of insects do not live long enough to behold their posterity. The fishes and amphibious animals cannot distinguish their young from others of the same species; and yet Nature instinctively teaches them the best means of providing for the principal wants of their progeny. The fishes repair in shoals for the purpose of depositing their spawn, to the level shores, where the young are more easily hatched, and find a sufficient subsistence. Amphibious animals, quitting the water, lay their eggs in the sand, and leave them to be hatched by the heat of the sun, as though they knew that their young would of themselves find the way to their proper element, and there seek the necessary food. Gnats and other insects which come to life in the water, but afterwards live upon the earth or in the air, always lay

their eggs in the water, where their young are destined to receive existence. The flying land-insects, most of which require no food for themselves, nevertheless deposit their eggs in plants, fruits, flesh, and other substances capable of affording nourishment to their young. Some of them follow other animals, for the purpose of insinuating their eggs into their skin, hair, mouth, or intestines; nay, there are even some that deposit their eggs singly in receptacles made by themselves, and place near the eggs a quantity of food suitable for the young, before they are hatched.

Other animals, which at the period of their birth are incapable of helping themselves, are consigned to the care and attention of their parents. How industrious are the birds, even before they lay their eggs! Each species has a peculiar method of building its nest. With what patience they sit upon these eggs for weeks together, almost neglecting their own food during the time. With what care they keep warm the young after they are hatched, and provide them with nourishment suited to their age! With what courage they defend them from all attacks. Is it not a remarkable instinct in quadrupeds, that they themselves cut with their teeth the navel-string of their young, but in such a manner as to prevent the loss of blood; that they not only suckle them, but also warn them of danger, and protect them from harm?

In general the instinct of the preservation of their young is much stronger in all animals, than the calls of hunger, rest, or self-preservation. They would endure hunger and thirst, deprive themselves of sleep and every convenience, nay, even expose their own lives rather than neglect

their young. In this instinct, implanted by the Creator in animals, I discover a wisdom which I can never sufficiently admire: for, on the care and attention paid to the infant progeny, depends the preservation of the whole species, and of every future generation. It is not surprizing that animals which bring forth their young alive should be attached to their own flesh and blood; but that such as lay eggs should manifest an equal solicitude for the preservation of their young brood, is wholly inexplicable. The eggs have a very different form from the parents, and bear not the least resemblance to an animal. The eggs are not yet visible when the birds begin to build their nests, and the insects to repair to those places where their future progeny may find subsistence; but nevertheless we see what tender care is taken by those animals to preserve their young from perishing.

Who doth not herein discover thy wisdom, O adorable Creator! Who doth not clearly perceive the goodness with which thou perpetuatest the animal kingdom, in order to render it subservient to our pleasures, our wants, and our convenience! Open my eyes that I may discover the wisdom of thy designs, and contribute, as far as lies in my power, toward their accomplishment.

## *AUGUST* 17.

### OF VARIOUS EXTRAORDINARY KINDS OF RAIN.

ALL the phenomena of Nature, however natural and salutary, may nevertheless excite terror and alarm in superstitious and ignorant minds. We find a proof of this in several species of rain, which

superstition regards as supernatural, and which have often thrown a great portion of mankind into no small degree of consternation.

Who does not tremble when he hears of showers of blood? Sometimes, especially in summer, drops of a reddish fluid, to which that name has been commonly given, are seen to fall: or rather, people have imagined that such a shower has fallen, when, after a common shower, they have found the surface of the water red, or a few drops in the fields tinged with that color. The common people believe that this is actually blood which has fallen from the atmosphere; and this being the case, it is not surprizing that this kind of rain should be ascribed to supernatural causes. In this phenomenon, however, there is nothing but what is perfectly natural: for as the atmosphere is charged with various kinds of substances, it cannot be thought extraordinary if the rain is sometimes mixed with those foreign matters, by which its color and its properties are altered. Thus it may easily happen that certain colored particles are precipitated with rain. The wind may raise into the air the colored pollen of different flowers, nay, even the reddish fluid ejected by the butterflies, and disperse them to a considerable distance. The surface of water is sometimes covered with small red insects, which are mistaken by the credulous for blood. Sometimes also, a reddish slime, generated in the atmosphere, may fall with rain, as it did in Westphalia and other countries in 1764. But if circumstances of this kind sometimes happen, they ought by no means to be subjects of astonishment, but, on the contrary, it would be surprizing if such events never occurred.

The same observations apply to the showers of sulphur, which are said to have frequently fallen. This kind of rain is not properly composed of sulphur, though it is possible, as the atmosphere contains so large a quantity of sulphureous particles, that some of them may be mingled with rain. By numerous experiments it has been ascertained that these showers are nothing but the colored seeds of vegetables and fine earths, brought by the winds from distant countries, and precipitated with the drops of rain to the earth. The supposed showers of corn are formed in the same manner. When heavy rains fall in places producing great quantities of the plant called little celandine, they lay bare the roots which are very slender, detach the small bulbs which adhere to them, and these are then taken for an ominous shower of corn which has fallen from the atmosphere, and, in the opinion of the superstitious, betokens an approaching dearth.

But how shall we account for the caterpillars, with which certain portions of a garden or field are observed to be covered after a shower of rain? Nothing is more natural than this circumstance. As the atmosphere contains bodies of every kind, it is not improbable that insects and their eggs may be floating in it. The latter want nothing but a place in which they may be hatched. Being carried down by the rain, these eggs adhere to the leaves of plants, and are soon developed. The possibility of this is demonstrated by a certain phenomenon, which, according to the report of writers most worthy of credit, takes place at Philadelphia. The rain which usually falls there in the month of August brings with it insects, which, if they settle upon any part of the human body, and are not re-

moved, occasion by their bite a violent itching; and when they alight upon woollen stuffs, they settle and multiply in them like moths.

The world is not sensible of the magnitude of its obligations to naturalists, who, by their researches and observations, have combated and eradicated so many superstitious notions and ridiculous prejudices. Still, however, they continue to prevail among the vulgar, which demonstrates that mankind have in general a much stronger propensity to error than to truth, and that they are not so thoroughly convinced as they ought to be of the wisdom and goodness of Divine Providence. Let us not, then, my brethren, disgrace our reason and dishonor the Creator by cherishing such absurd ideas. Let us hail every discovery which tends to convince us of the all-wise government of God; and let it be to us a never-failing source of consolation, that nothing can happen in the world but what is designed to answer some wise and useful end. To the heathen, and other votaries of infidelity and superstition, let us leave the ridiculous notions of which we have been treating. But let us, my brethren, who enjoy the happiness of knowing the true God, honor him by faith and confidence, and contribute by every mean in our power to diffuse reason, wisdom, and piety among mankind.

## *AUGUST* 16.

### SENSIBILITY OF PLANTS.

We observe in plants certain motions which make it doubtful whether we ought to ascribe sensi-

bility to them or not. There are vegetables which contract their flowers and leaves in damp and cloudy weather, or when they are touched. Some open and shut their flowers at certain hours, so as to denote with tolerable precision the time of the day. Many assume at night a peculiar form by folding up their leaves. These motions take place, whether the plants are left in the open air, or are shut up in close apartments. Those plants which live under water raise their flowers, during the period of fecundation, above the surface. The motion exhibited by a marshy plant, discovered some time since in the American province of Carolina, is still more extraordinary. Its round leaves are furnished on the upper surface and on the edges with a multitude of spikes, which are extremely irritable. When an insect alights upon it, the leaf folds up, impales the intruder, and holds him fast till he dies, on which it again opens of itself.* We may

* This extraordinary plant is known by the name of *Dionæa muscipula*. Smellie, in his *Philosophy of Natural History*, describes it in these words: "Its leaves are jointed, and furnished with two rows of strong prickles; their surfaces covered with a number of minute glands, which secrete a sweet liquor, that allures the approach of flies. When these parts are touched by the legs of flies, the two lobes of the leaf instantly spring up, the rows of prickles lock themselves fast together, and squeeze the unwary animal to death." The reader will not be displeased to find the reflections of Dr. Paley on this singularity in the vegetable economy subjoined. "Here," says that writer, "under a new model, we recognize the ancient plan of Nature; namely, the relation of parts and provisions to one another, to a common office, and to the utility of the organized body to which they belong. The attracting syrup, the rows of strong prickles, their position so as to

daily observe a kind of motion in certain plants in our gardens. The tulips open when the weather is serene, and close their flowers at sun-set and during rain. Vegetables with pods, such as beans and pease, open their shells when dry, and even roll them up like shavings. Wild oats, when laid upon a table, will move spontaneously, especially after having been warmed in the hand; and who has not observed that the sun-flower, and many other plants, continually turn toward the sun.

All these are incontestable facts, which every person may easily verify. Some have concluded from them, that we ought not absolutely to deny the sensibility of plants. It is true that vegetables, considered in this point of view, afford many arguments in favor of their sensibility; but, on the other hand, we discover in them not one solitary sign of sensation. In vegetables, every thing appears to be perfectly mechanical. We raise a plant and destroy it, without perceiving any analogy between it and an animal, which we rear and kill. We see a plant germinate, grow, blossom, and bear seed, just in the same manner as the hand of a watch runs round all the points of the dial. In the most careful dissection of a plant we cannot discover any organ resembling that which is the seat of animal sensibility. When we oppose these observations to those facts which favor the inference of sensibility in plants, we are at a loss what to

interlock, the joints of the leaves, and, what is more than the rest, that singular irritability of their surfaces by which they close at a touch; all bear a contributory part in producing an effect connected either with the defence or with the nutrition of the plant." T.

think, or how we are to regard these phenomena. Perhaps all the motions which we remark in plants proceed from the structure of various kinds of fibres, which are sometimes contracted, and sometimes dilated; and perhaps it is the subtle exhalations of our bodies that cause the sensitive plants, as they are denominated, to shrink when we touch them. It may be too, that as a gradual progression is established throughout all Nature; there may be certain plants in which the first degree of sensibility commences; for, in fact, the distance between the plant and the zoophyte, or even the shell-fish, is very small. Thus sensibility is perhaps extended to plants, at least to those which approach nearest to the animal kingdom.

Hence you perceive, my dear reader, that a great portion of our knowledge of this subject is founded on mere conjecture. The sensibility of plants can neither be affirmed nor denied with certainty. We must rest satisfied with probabilities, and not seek to overleap the boundaries prescribed to our knowledge. But let us firmly believe, to the honor of our all-wise Creator, that, whether plants are endued with sensibility or not, the arrangements which he has made respecting them were designed to answer the wisest ends. We may well dispense with any extension of our knowledge respecting this part of the constitution of the vegetable kingdom; and though this point remains problematical, yet what we already know of this portion of Nature is sufficient to gratify our curiosity, and to excite us to glorify God. Be it then our constant endeavor to make a proper use of the knowledge we already possess, without inquisitively prying into subjects

to which our limited faculties are not adapted; the disclosure of which is perhaps reserved for future generations, or for eternity.

## *AUGUST* 19.

### OF THE DREAD OF THUNDER-STORMS.

At a season when all Nature presents to our view nothing but scenes of joy and gladness, we nevertheless hear many persons complaining of the want of pleasure. The summer, say they, would be agreeable enough, if storms did not stifle in the heart all sensations of joy. This fear of thunder-storms principally proceeds from the erroneous opinion that they are judgments of heaven, and instruments of the wrath of an offended God. For if we were to consider how much storms contribute to purify the air and fertilize the earth; if we would employ the necessary precautions against the dangerous consequences of lightning; they would lose a great portion of their terror, and they would appear in the eyes of all rational people as an important benefit, which is rather calculated to inspire us with gratitude than to overwhelm us with fear.

But, it may perhaps be objected, are not thunder-storms frequently productive of mischief? How often are whole towns and villages consumed, and men and cattle destroyed by lightning! In this circumstance, as in many others, terror magnifies the evil, and any one may be convinced of the improbability that he shall be struck by lightning, when he is informed, that only two persons were killed by it out of seven hundred and fifty thousand

persons who died in London in the space of thirty years. Nothing is more absurd than the notion which prolongs the terror of most people without any occasion: I allude to the alarm excited by the roaring of the thunder. He who has time to be affrighted at this natural consequence of lightning, is out of danger; for it is the lightning alone that can do any mischief. When we have seen it, and remain unhurt, and the thunder does not immediately follow, it is doubly foolish to be alarmed by the latter, or to stop our ears against the harmless sound. A reflection which may alleviate our fears, if not entirely dispel them, and enable us to wait after lightning with perfect composure for the thunder, is, that it can do you no more injury than the report of a cannon. It ought rather to be considered as a token which announces that we have escaped the effect of the lightning, and informs us of the distance of the danger; for the longer is the interval between the lightning and the thunder, so much the more remote is the place where the storm is generated.

One of the surest methods of preserving ourselves from all anxious fear of thunder-storms, and other phenomena of Nature, is, to avoid every thing which can disturb our conscience; for it is a bad conscience that fills the greatest part of mankind with terror of the effects of Nature. The righteous man remains composed, and fears not the judgments of the Almighty. He knows that God converts the incidents of Nature into instruments of his wrath against sinners; but when he appears clothed in terrors, and overwhelms the guilty soul with horror, the good man, unappalled, knows that he is secure under the protection of the Most High.

Images of death exhibited by summer

He hears the thunder roll without trembling. That God who created the thunder, knows where to threaten, and where he ought to strike. His right hand plays with tempests and storms, and makes use of them to convince the wicked of his existence, and to strike terror into his guilty soul. Tremble not, then, ye friends of God; be it your glory to love him, even when he causeth his thunders to roll, and his lightnings to flash around you. Ye will one day be elevated far above the regions of storms, and ye shall walk upon the clouds, while lightnings illumine your steps. Then will you be convinced that storms are blessings conferred by the Lord, and praise him who, when clothed in terrors, is yet mindful of the earth, and purifies the atmosphere. With one hand he launches winged lightnings; with the other he refreshes our fields with his rain, and thus attempers his justice with his mercy.

## *AUGUST* 20.

### IMAGES OF DEATH EXHIBITED BY SUMMER.

WHEN I walked a few weeks since in the gardens, I was surrounded on every side with pleasing objects, but now the prospect daily becomes more sad, or at least more uniform. The greatest part of the flowers which then imparted such charms to the garden, have now disappeared, and only a few faint traces remind me of the delightful spectacle which a few months ago they afforded. This revolution in Nature may be a very useful lesson for us. There is a period in our lives in which we put forth the blossoms of spring. We are admired,

Images of death exhibited by summer.

we are caressed, and the richest fruits are expected from us. How often, alas! do we disappoint these hopes! The blossoms fall before they are unfolded. Sickness blights our opening charms, and an early death blasts all our expectations.

I have remarked that the spring flowers, when they continue to blossom till summer, frequently wither in a few hours. What a striking emblem of death! We see almost daily instances how suddenly, how unexpectedly death may overtake us; and how many means the Almighty can employ to accelerate our end. Habit, indeed, renders us indifferent to the death of so many of our fellow-creatures, who are suddenly snatched from our midst, but the observation of the Psalmist is not the less true: The life of man is as grass. He flourisheth like a flower of the field. When the wind passeth over it, it is no more, and the place where it grew is no longer known.

This is the season in which we seek shelter from the intense heat of summer, and repair beneath the refreshing shade of the groves. But are not these retreats calculated to remind us of the darkness and silence of the grave? There, after I have sustained the burden and heat of the day, I shall at length find refreshment and repose.

The reaper prepares for the harvest. The sickle levels the tall ears on either side, and leaves behind it a bare and empty field. Here is another emblem of human life. All flesh is as grass, and in point of duration it resembles the flowers of the field. Man flourishes for a short time, and is cut down whenever the lord of the harvest orders.

The very bees themselves teach me a lesson of death. When I observe the activity with which

they collect and prepare their honey, I am reminded of my duty to lay up in time those stores of wisdom and virtue which can alone afford me consolation in old age and in death.

The husbandmen assemble to convey the gifts with which God has covered the fields, into the granaries. The days of harvest are the most solemn of any in the year. How much more solemn will be that great day, when the Creator himself shall gather in his harvest, when the dead shall burst from the recesses of the tomb, and the supreme judge shall say to his reapers, the angels: "Collect the tares into bundles to be burned, but gather the wheat together in my garner." With what joy my soul awaits the day of that great harvest. Here I have gone forth weeping, and bearing precious seed, but I shall one day appear before the throne of my judge with rejoicing, bringing my sheaves with me.

These are not the only images of death which Nature presents, but merely the most striking. Every one who rightly considers them cannot fail to regard them as emblems of human frailty. Nor need we fear lest such reflections should dissipate the joy which it is so natural to indulge in summer. The meditation on death is the surest method of rendering that beautiful season still more agreeable than it is to the generality of mankind. When we behold death in a right point of view, so far from regarding it as the enemy of our joys, it will give a zest to our highest pleasures. Shall we thoughtlessly indulge in excesses during the season of summer, if the image of death is ever present to our souls? Shall we abuse the blessings which God hath conferred upon us, if we recollect that the hour

approaches when we shall be called to give an account of our stewardship? Shall we suffer our hearts to hanker after the goods of this world, if we consider how soon all terrestrial things pass away? Shall we so bitterly complain of the burdens we are obliged to bear during the heat of the day, if we remember that night approaches to afford us refreshment and repose? Shall we place all our felicity in the enjoyment of this world and its pleasures, if we reflect that we are destined for a better world, where we shall partake of delights infinitely more pure and exalted?

## *AUGUST* 21.

### CAUSES OF HEAT ON THE EARTH.

ONE of the principal causes of heat on the globe, is the sun, and his position relative to any particular part of the earth. When the sun is on the southern side of the earth, the regions of the northern hemisphere have not so much heat as when he approaches the north pole. The same is the case with the southern hemisphere when the sun is turned toward the north. In those countries where the sun is almost always vertical, the cold is never so intense in the vallies and plains as to freeze rivers and lakes. The heat, on the contrary, there rises to a very high degree. It likewise becomes extremely fervent when the sun's rays fall for a considerable time on the same spot. In certain regions towards the pole, where the days are very long, the heat is at times exceedingly powerful. From all these circumstances we are obliged to admit that the sun and his relative position to the earth

are the principal causes of the warmth of the atmosphere.

Other observations, however, prove, that the sun is by no means the only cause of the different degrees of heat: for in this case every summer would be equally hot, and every winter equally cold; and every country situated under the same climate would have an equal degree of temperature. Both these positions are contradicted by experience; for it is found that on hills and mountains, though on the latter there are often not only spacious plains, but also other hills and dales, it is much colder than in the level country and in the low vallies. Even under the line itself the heat decreases so considerably upon the mountains, that, if you have an opportunity of ascending to an elevation of two thousand fathoms, you may exchange the burning heat of the plain for the region of everlasting ice and snow. It has likewise been observed that in winter the most intense cold sometimes changes to a mild temperature at midnight, when there is no sun to warm the atmosphere. Thus it is obvious that there may be a heat in the air, without being immediately produced by the sun, and consequently that luminary cannot be the only cause of heat.

There are bodies which become hot, and even take fire by friction and percussion. The axletrees of wheels will take fire when they turn with very great rapidity, and have not been properly greased. There are also bodies which produce heat and even inflammation by their intermixture. If you take a truss of hay or straw, and pour a sufficient quantity of cold water upon it, a considerable degree of heat will take place. Bodies which undergo putrefaction or fermentation, generally acquire an increase

of temperature, which may either be felt with the hand, or ascertained with the thermometer. So in the atmosphere there may be certain agitations, mixtures, and solutions of various substances, that may produce warmth, nay, even a very great degree of heat.

We may therefore consider the following as the method in which heat is produced in the atmosphere. The sun is the principal agent. The heat proceeding from this luminary receives an accession from that of many living creatures, from the fires kindled with coals, wood, and other combustibles, and likewise from that which comes from the bosom of the earth, the depths of the sea, and warm springs. This heat is farther increased by the fermentation of different kinds of bodies which takes place on the surface of the earth and in the upper regions of the atmosphere, where they produce warm exhalations. When, therefore, the minute particles of every kind which float in the lower regions of the atmosphere, and are capable of receiving and retaining warmth, become heated, and they are not cooled or carried away by wind or rain, the temperature increases, and rises to a very high degree. It must, on the contrary, diminish, when any of the causes producing heat ceases to operate.

This also, O my heavenly Father, is an arrangement of thy wisdom and goodness. Thou hast thereby provided for the comfort of the inhabitants of every region of the globe, and hast assigned to every climate the degree of happiness of which it is susceptible. To us, who live in a most temperate climate, thou hast particularly manifested thy benevolence: Heat and cold are distributed in the wisest proportion, and we have the greatest reason

to acknowledge the wisdom and bounty of thy dispensations, and to praise thee for every one of them.

## *AUGUST* 22.

### DIVERSITY OF PLANTS.

THE wisdom conspicuous in the constitution of the vegetable kingdom is particularly displayed in the great variety observable in plants. The vegetable productions of the earth differ with respect to their parts, their fructification, their virtues, and their properties.

In many plants, the manner in which fructification is performed is not perceptible, as, for instance, in the mosses, the fungi, and ferns. We find among plants singular deviations of Nature from her accustomed course in what may be termed vegetable monsters. There are flowers which have no corollæ, and some spring forth from the middle of other flowers. Some plants sleep, others turn with the sun, and others again contract on being touched. Certain kinds of flowers open and shut, according to the weather, or at certain hours of the day. Some shoot up, blossom, bear fruit, and decay earlier than others, and in the same order in each succeeding year. They are likewises natives of different countries, and affect different situations. Every plant is to be found wild; that is, growing spontaneously, without cultivation, in some particular region of the globe.

The Creator hath assigned to plants the climate best adapted to their nature, and most suitable to their perfection. If, in the cultivation of plants,

we are attentive to procure them that temperature which their nature requires, we may rear those of foreign countries in the same degree of perfection as they attain in their native soil. The different forms of plants are particularly pleasing to the eye. Whether we compare the more perfect species with those which are less so, or only the different species of the same class, it is impossible to withhold our astonishment at the manifold variations of the model after which Nature has fashioned the vegetable kingdom. We pass with amaze from the truffle to the sensitive plant, from the mushroom to the carnation, from the toad-stool to the lilach, from the nostoch to the rose-bush, from the moss to the cherry-tree, from mould to the chesnut-tree, from the moril to the oak, from the misletoe to the orange-tree, from the ivy to the pine. If we consider the numerous family of mushrooms, or the class of fungi in general, we are astonished at the fecundity of Nature in the production of those plants which are so widely different from others in form, that they would scarcely be taken for vegetables. As we rise higher in the scale to other genera, we behold with pleasure the long series of tubular plants, from the grass which springs up between the stones, to the valuable production which affords us the aliment most necessary for our subsistence; and afterwards direct our view to the prodigious variety of creeping plants, from the tender bind-weed to the vine.

A circumstance which cannot be sufficiently admired in the works of Nature, is, that the most perfect harmony is combined in them with this infinite variety. All the plants, from the hyssop that grows upon the wall to the cedar of Lebanon, have

the same essential parts. A blade of grass is as perfect as the beauteous rose, and the latter is not less complete than the stately oak. All belong to the same kingdom; the same general laws govern their growth, their propagation, and increase; but yet each species is different from the rest. Among so many thousands there is not one but what has its distinct character, with respect to nourishment, proportions, growth, and propagation. What inexhaustible riches are here displayed in forms, colors, and proportions!

And how happy am I, in being endued with the faculty of observing this variety, and of enjoying the manifold beauties of the vegetable kingdom! What delight is not this employment capable of affording! Having once tasted these pleasures, I have found in them such charms, that in order to resign myself wholly to their enjoyment, I would willingly renounce all other gratifications. Then shall my enraptured spirit elevate itself to thee, thou Lord and Father of the creation! Thy omnipotence which produced the numberless species of vegetables, the wisdom with which thou hast constituted them, and the bounty which is manifested in their infinite variety, shall powerfully impel me to celebrate thy praise. How indeed could I neglect a duty, to the performance of which all Nature excites me, without betraying a heart the most obdurate and the most ungrateful! And if this were my case, how could I hope for thy approbation and thy love!

## *AUGUST* 23.

### GENERAL OBSERVATIONS ON THE ANIMAL KINGDOM.

THE animal kingdom may be regarded as a well-regulated state, every part of which has a due proportion of inhabitants; where each possesses the faculties necessary for the occupations assigned it, is excited by punishments and rewards to the performance of its duties, and at the same time enjoys a sufficient protection against its enemies. In this republic of animals, the smallest and the weakest are obliged to submit to those that are stronger and more powerful; but all of them are subject to man, as the representative of the Deity. The individuals of the animal kingdom find employment and subsistence in every region of the globe; they are distributed over its whole surface, and their different organs and constitutions are adapted to the situations which they are designed to inhabit.

The occupations for which they are destined are extremely various; but all of them tend either to the encrease of their species, and to the establishment of an equilibrium between the animal and vegetable kingdoms, or to their self-preservation in respect to their subsistence and defence. To fit them for these employments, all the members of the bodies of animals are adapted to the qualities with which each species is endowed, and the functions they are designed to perform. To this end the Creator hath implanted in them certain instincts, which compensate for the want of reason. These instincts are the most convenient means for the preservation of themselves and their species, and for maintaining a due proportion among them.

They have instincts for motion; instincts which enable them readily to find, distinguish, and prepare their food; instincts which teach them to construct suitable habitations, to propagate their species, and to defend themselves and their young.

Many classes of animals live upon prey, being designed to subsist on the superabundance of other animals. That the different species may be kept at a certain number proportioned to their wants, each has its peculiar place of abode, habitation, and enemies. Thus it is that the equilibrium of Nature is maintained. Such animals as are sick or infirm are commonly the first that fall a prey to others: dead vegetables and animals are consumed, every impurity is removed out of the way, and the splendor of Nature is preserved and renewed. The predatory animals have a structure conformable with their destination; possessing either extraordinary agility, art, or cunning: but as they were not created for the purpose of exterminating certain species of animals, they are restricted within certain limits. They do not multiply so fast, and even destroy one another, or at least their young fall a prey to other species. Some pass the winter in sleep, digest slowly, or, for want of other food, consume vegetable productions. The weaker animals are provided with means of defence proportioned to the dangers to which they are exposed, in their weapons, their armor, and their inaccessible habitations; so that their enemies are unable to destroy a greater number of them than the equilibrium of the animal kingdom requires.

The animals are in some measure compelled to fulfil the functions assigned them, because each of them finds that comfort and that degree of happi-

ness which it is destined to enjoy in following its peculiar instincts. In complying with the laws which Nature has prescribed, they find certain advantages and conveniencies; but on the other hand, the violation of those laws subjects them to punishments. The mammalia are the largest in size, and for that reason the fewest in number, but fulfil very important functions. The birds are designed also for purposes of great utility; they consume superfluous seeds and fruits of plants, devour carcases, and diminish the number of almost every kind of insect. Most of the amphibious animals subsist upon prey. The smallest animals are the most numerous; they are also the most active, but at the same time they are more voracious than those of larger size. They consume the fruits of various plants, and are subservient to many useful ends.

All that we admire in the animal kingdom proves the existence of a being who possesses all the treasures of wisdom and intelligence. Who else could have peopled this vast globe with so many living creatures, of species so infinitely diversified, and could have provided them with every thing necessary for their comfort and subsistence? Who but he could have supplied them with food adapted to their different tastes, could have furnished them with such convenient clothing, weapons, and armor, could have implanted in them such sagacity and cunning, so many instincts and arts? Who but he could have preserved the equilibrium among so many different species and classes? Who but he could have assigned to every living creature the element most suitable to its nature; could have conceived such an astonishing variety of members, joints, bones, muscles, and nerves; could have

combined and adapted them with so much skill, in order to give each part that kind of motion which the mode of life of the animal, and other circumstances required? Yes, Lord God omnipotent, it is thou alone who hast done all these things. To thee belong glory, honor, praise, and thanksgiving, for all the wonderful works which thou hast created. The contemplation of the animals and the benefits I derive from them shall excite me to pay to thee that tribute of love and gratitude which is so justly thy due.

## *AUGUST* 24.

### DIVISION OF THE EARTH.

ALL the known regions of the globe are divided into four principal parts, which are called Europe, Asia, Africa, and America. Of these Europe is the smallest, being only about three thousand three hundred miles in length, and two thousand three hundred in breadth. Its inhabitants, however, possess countries in the other three divisions of the globe, and have reduced nearly half the world under their subjection. No other nations but those of Europe traverse every part of the globe to collect the produce of every clime. Of all the nations of the earth they are the most enlightened, and have made the greatest progress in arts and sciences. Europe is the only division of the globe that is every where cultivated, and covered with towns and villages; whose inhabitants maintain an uninterrupted commerce with each other, and, a few excepted, profess one general religion. The other three parts of the world are inhabited by a

number of nations, who have no reciprocal connection, who are utter strangers, or nearly so, to each other, and differ exceedingly in their manners, customs, mode of life, and religion.

Asia is the largest continent of the globe. Its length is about seven thousand five hundred miles, and its breadth five thousand two hundred and fifty. As the countries in the interior of this prodigious continent are not visited by the refreshing sea-breeze, as they are not watered by many rivers, but are composed of widely-extended plains and barren mountains, the heat and cold are both extremely intense, the earth will not repay the labors of the husbandman, and it has therefore never been regularly cultivated. These regions are still inhabited by tribes, who in the morning demolish their towns and villages, proceed with them a few miles, and erect them again at night in the space of an hour. It may be said that Nature herself has rendered this wandering life necessary, and has made the laws, government, and institutions of these tribes more fickle and changeable than those things commonly are. All Asia has frequently suffered from the restless disposition of these erratic hordes. The northern part of Asia, which abounds in lakes, marshes, and forests, has never been regularly inhabited. On the contrary, the southern, eastern, and western countries of Asia are the finest in the world, especially the former, which are luxuriantly fertile, and produce in abundance all the necessaries of life.

The largest continent next to Asia is Africa, which is four thousand two hundred miles in length, and about the same in breadth. As it is situated in the torrid zone, it contains vast sandy desarts,

mountains of prodigious height, whole tracts of consumed forests, and monsters of every kind. The intense heat enervates all the faculties of the soul; and hence it is found to comprehend very few well-regulated states. Though this division of the globe is the most contiguous to Europe, it is, at the same time, the least known; and of the interior we are almost entirely ignorant.

America was not discovered by Europeans till about three centuries ago. It is composed of two extensive continents, connected by an isthmus, which is surrounded by a great number of islands. The northern part has not been entirely explored, on account of the excessive cold, its scanty productions, and its prodigious distance from the inhabited regions. Forests and marshes still cover a great portion of the country, and the eastern shores alone have been cultivated by the Europeans. In the southern part the first discoverers found some considerable kingdoms; but the rest of the country was inhabited by savage nations. America produces larger insects, serpents, and reptiles than any portion of the globe; of all the divisions of the earth it is the most extensive and the least populous.

When we calculate the number of miles comprized in these four quarters of the world, the total extent will perhaps appear prodigious; and yet all the known regions of the globe form no more than one fourth of its whole dimensions. And what is our globe in comparison of the orbs which the Almighty hath placed in the firmament? It is lost in the innumerable multitude of celestial bodies, like a grain of sand in a lofty mountain. To us, however, in whose eyes a span is a considerable length,

the terrestrial globe cannot but be a magnificent theatre of the wonderful works of God. And the less we know of the worlds which roll above our heads, so much the more diligently let us study to make ourselves acquainted with the earth which we inhabit, and to apply our knowledge to the glory of our Creator.

## *AUGUST 25.*

### OF THE NATURE AND PROPERTIES OF LIGHT.

THOUGH we every moment experience the benefit of the light which is diffused over the face of the earth, we cannot precisely determine its nature. All that the greatest philosophers have advanced on the subject rests upon conjecture. Perhaps light is a fluid surrounding us and the whole earth, and which, in order to become perceptible, requires only to be agitated by the sun, or other inflamed bodies. Perhaps it is fire itself, which, by the projection of its infinitely subtle particles at a certain distance from us, illumines us with its softened rays. The former hypothesis has been adopted by the most celebrated naturalists. It is nevertheless certain, that there is an essential difference between fire and light. The former is infinitely more gross than the latter. Fire takes a considerable time to penetrate through glass, but light passes through it instantaneously. The pores of the glass must consequently be large enough not to detain the light in its passage, or to obstruct it in its motion; but fire must experience more resistance because it is of a grosser nature. It is likewise worthy of remark, that fire moves with far less velocity than light.

Of the nature and properties of light.

When a fire is made in a room, the heat extends slowly through the apartment, and the air becomes gradually warmer: but the moment a candle is brought in, it diffuses a light to every part of the chamber to which its rays can penetrate.* From these and other reasons it is concluded that fire and light are different substances, though they exist in conjunction, and one is capable of producing the other: but who knows if all the deductions that have been made on this subject are not erroneous?†

No more than we are able to ascertain the nature of light, no more can we account for its properties and effects. Let us form a conception, if it be possible, of the velocity with which light travels. Were the motion of light not more rapid than the motion of sound, it would require the space of seventeen years to reach us from the sun; but, according to the system adopted by the Creator, it travels to us from the sun in seven or eight minutes. In this short interval each of the sun's rays traverses

* It is stated by Enfield in his *Philosophy*, that, if a candle is lighted, and there is nothing to obstruct its rays, it will fill the whole space within two miles round it, almost instantaneously, and before it has lost the least sensible part of its substance. T.

† Notwithstanding the reasoning of the author, the facts adduced by many celebrated modern philosophers in support of the system which supposes light to be a modification of the matter of fire, or a combination of that element with some unknown principle, render that hypothesis at least extremely probable. This theory appears to rest principally on the great fact of the sun's rays producing, by concentration, all the effects and phenomena of actual fire; and, according to its principles, if light does not always produce actual heat, it is owing to the minuteness of the particles, and the extreme rarity of the fluid. T.

more than ninety millions of miles; and consequently the particles of light fly at the rate of two hundred thousand miles every second of time, which is above a million times swifter than the motion of a cannon-ball.* As sound travels at the rate of only eleven hundred and forty-two feet in a second, a particle of light must consequently be above a million times as subtle as a particle of air, though the latter cannot be perceived either with the naked eye, or with the best instruments. According to astronomical calculations, the rays of light from the fixed stars, before they reach us, must traverse a space, which a cannon-ball, proceeding night and day with its original velocity, could not travel through in one hundred thousand millions of years. The expansion of light is not less astonishing. This expansion is unlimited, extending throughout the whole universe, a space so vast as to surpass all human conception. To this expansion of light it is owing that we are enabled to discern the most remote objects, for instance, the celestial bodies, with the naked eye, or by means of telescopes: and could we obtain instruments of powers as extensive as the expansion of light, we might discover the extreme verge of the immense system of the universe.

Human understanding is indisputably too confined to fathom all the designs of the Deity respecting the nature and effects of lights: but how much might we not comprehend, if we were to bestow due attention on what we see! Why does light move with such excessive velocity, and why is it endued

* A cannon-ball flies with the velocity of about a mile in eight seconds. T.

with such astonishing rarity, except to render innumerable objects visible, at one and the same time, to numberless eyes? If its rays move with such rapidity, is it not for this reason that we may quickly perceive the most remote objects? If the transmission of the rays of light required a longer interval, it would be productive of many inconveniencies. The effect of the light would be much weakened and diminished; the rays of light would be far less penetrating, and darkness would not be so easily or so rapidly dissipated. Why are the particles so infinitely subtle, except to render objects visible to those inconceivably minute eyes which are destined to see them? Why are they not closer together, but widely scattered,* unless that they may neither dazzle us by their brilliancy, nor injure us by their heat? Why are the rays of light repeated in so many different ways, but to enable us to distinguish the various objects which present themselves to our view?

All these dispensations of the Deity contribute to the welfare and comfort of his creatures. What gratitude I owe thee, O Father of Light, for this wise and bountiful arrangement! Hadst thou not

* "It is a well-known fact," says Dr. Gregory, in his *Economy of Nature*, "that the effect of light upon the eye is not instantaneous, but continues for a considerable time. Now we can scarcely conceive a more minute division of time than the one hundred and fiftieth part of a second. If, therefore, one lucid point of the sun's surface emits one hundred and fifty particles of light in one second, we may conclude that this will be sufficient to the eye without any seeming intermission; and yet such is the velocity with which light proceeds, that still these particles will be at least *one thousand miles* distant from each other." T.

created light, how imperfect would have been our enjoyment of life; of how many sources of pleasure should we have been deprived: how circumscribed would have been the circle of our knowledge and occupations!*

## *AUGUST 26.*

### STRUCTURE OF BIRDS.

BIRDS must indisputably be classed among the most beautiful of the inhabitants of the earth. The structure of their whole body and its minutest parts is so regular and so perfect, as to be alone sufficient to convince us of the wisdom of the Creator. They have bones like the mammalia, but they are differently clothed. Their bodies are covered with feathers, which are laid one over another, and are attached to the skin in rows, having soft down between them. Each feather is composed of the quill and the beard. The quill, which is the lower part, is hollow, and through this tube the feather receives nourishment; higher up it is filled with a kind of marrow. The beard is composed of fibres, affixed in an oblique direction on either side of the trunk or stem, and adhering closely to each other. Instead of having fore legs, like quadrupeds, the birds are furnished with two wings. These consist of eleven bones, and in the muscles that cover them are fixed the feathers, by means of which they fly. These feathers, which are wanting in

* A great portion of these reflections on light are borrowed from the Physico-Theology of our countryman Derham.

very few species of birds, are turned backward, and form a kind of vault, which is strengthened by two rows of smaller feathers that cover the roots of the larger. The mechanism of the wings is truly admirable. They do not strike backward, like the fins of fishes, but perpendicularly downward, by which the flight of the birds is greatly facilitated. The wings are somewhat hollow, that they may grasp a greater quantity of air, and at the same time so close that no air can find a passage through them. Between the two wings the body is suspended in perfect equilibrium, in the manner best adapted to facilitate the operations of flight. The head of birds is small, that its weight may not retard their course, and that it may be the more fit for cleaving the air. The tail not only serves them for a rudder, but assists them to maintain the equilibrium of their bodies, both in ascending and descending. The legs, of which each bird has but two, are in general so situated as to support the body in the centre of gravity. In some birds they are placed farther back, and are adapted only to swimming. The thighs are covered with muscles, and in most species they are clothed with feathers; but the legs are composed only of skin and bone, and are generally bare of feathers. Most birds have four toes; three before and one behind. At the extremity of the toes are the claws, with which they either hold themselves firmly on their perches, or seize their prey or their food. Some birds live upon animals of different sizes, others upon plants, and principally upon the seeds and fruits of vegetables. Those which subsist on seeds first steep and soften them in their crop, whence only a small portion of the aliment passes at once into the stomach,

which in these species is very small, but is composed of very strong muscles, by the action of which the food is ground with great force, especially as these birds in general swallow sand and stones, to promote the process of digestion. The birds of prey have a much weaker stomach, and likewise have recourse to stones to assist it.

We should have lost all pretensions to reason, were we not to discover, in the organization of the body of birds, traces of the providence and of the wisdom of God. Each of its parts is as admirably adapted to the manners, habits, and mode of life of the bird as it can possibly be. The whole structure of the body is in the most perfect harmony with the wants of the animal. The stork and the heron, which obtain most of their subsistence in marshy places, are provided with long legs and necks, that they may walk in the morasses without wetting their bodies, and yet be able to seize their food. The falcon and the eagle, which are birds of prey, have large wings, strong talons, and sharp beaks, without which they would perish of hunger. The bill of swallows is narrow and pointed, but opens extremely wide, that on the one hand they may not miss the insects which they meet with in their flight, and that on the other they may transfix them with the greater facility. The swan has in its wind-pipe a reservoir, whence it is supplied with air while it dives beneath the water. Many of the small birds which fly and hop about in thickets, have a membrane which covers their delicate eyes, and protects them from injury. In a word, the structure of every bird is adapted to its wants and mode of life. Each species is perfect in its kind; and not a member is superfluous, deformed, or

without its utility. The wisdom which they display commands so much the more admiration, when we consider that all the parts of birds, at the same time that they are appropriated to their respective wants, likewise contribute to the beauty of their exterior conformation. What an astonishing variety of structure, proportion, color, and voice, is there from the raven to the swallow, from the partridge to the vulture, from the wren to the ostrich, from the owl to the peacock, from the crow to the nightingale! All these birds are beautiful and regular in their several kinds, but the beauty and regularity of each are of a description peculiar to itself.

It is thus, my dear reader, that the sight of birds may be useful and edifying to you, if you elevate your heart to that God who created them. What an agreeable occupation and what pure pleasures the contemplation of the feathered tribes will then be capable of affording you!

## *AUGUST 27.*

### REFLECTIONS ON THE HEAVENS.

If we only turn our eyes towards the heavens, we behold a most magnificent structure, which cannot fail to impress our hearts with awe and admiration. How brilliant is yon azure vault, that canopy formed with such inimitable art, especially when it is illumined at night by the soft radiance of the moon, and besprinkled with thousands of glistening constellations! Who could ever raise his eyes and contemplate this spectacle without admiration and delight? But we discover more numerous wonders

when, with the mind's eye, we range through the wide expanse, and give a free scope to our reflections. Where are its limits, and where shall we find its beginning or its end? Unnumbered spheres of prodigious magnitude roll one beyond another in their prescribed circles; and the mind of the man who would soar in idea through their glorious ranks, would soon be convinced of its weakness and imbecility. A pure ethereal atmosphere, to which nothing is equal in subtlety, replenishes this space; and yet it is capable of supporting globes of prodigious magnitude and inconceivable weight, and of keeping them in those orbits in which they are destined perpetually to revolve. Neither columns nor props sustain this immeasurable vault, and the enormous burdens with which it is charged. It is neither suspended nor attached to any thing, and yet it has subsisted many thousands of years, and will still continue to subsist, without experiencing the slightest decay.

How astonishing is the number and magnitude of the orbs with which the regions of ether are filled! How far the sun, and most of the planets which revolve around him, surpass in size the earth which we inhabit! And who can tell how many of the other constellations are not inferior to these, or even perhaps far exceed them in magnitude! Their prodigious distance causes them to appear like petty lamps twinkling in the firmament. But in reality they are suns, whose circumference is immeasurable. The naked eye alone can perceive a countless multitude of celestial bodies, when at night the absence of the more powerful light of the sun permits their glimmering radiance to be discerned. And how much more is it enabled to discover with the

aid of instruments! Still it is extremely probable that there exist many others beyond the range of the best telescopes. It is not too bold an assertion that many thousands of suns and worlds revolve in ether, and that our whole solar system, with its planets, and this globe which we inhabit, form but a very small portion of that glorious host, which is marshalled in such exquisite order in yon boundless expanse.

The contemplation of this subject must necessarily fill us with admiration; but how many wonders, far superior to these, may not a reflecting mind discover in the firmament. All these heavenly bodies are subject to a continual motion which is regulated by immutable laws. They are all continually revolving round their own axis, and the greatest number of them describe prodigious circles about other bodies. Each has its prescribed orbit, from which it never deviates. They speed their course with a rapidity that surpasses conception. They are propelled by a certain irresistible power from their centres, but another power, not less mighty, retains them in their orbits. Though so many thousands of them are revolving together, yet one of them never impedes another, but all observe their appointed order. Notwithstanding the confusion which to human eyes might seem to prevail among the constellations scattered through the firmament, the greatest harmony pervades their brilliant ranks. For several thousand years they have now regularly risen and set in the same manner, and astronomers have been enabled by their observations to predict, with the utmost accuracy, their position and their course. How great would be our astonishment, if we possessed a

more intimate acquaintance with the nature, organization, and laws of these systems of worlds. Our knowledge is confined only to that of which our globe forms a part, and of which the sun may be regarded as the monarch.

Who can lift up his eyes and contemplate the firmament, without feeling the most profound awe for the greatness of the divine architect who constructed the heavens. But if, reader, thy faculties are bewildered by the contemplation of his majesty, let this excite thee to glorify, and to pay the humblest adoration to this almighty Being. When thou feelest how far thy homage falls short of his majesty, reflect on that important change which awaits thee, when thou shalt soar aloft, and contemplate unobstructed those wonders, of which thou hast here but a glimpse, while thy enraptured spirit shall be penetrated with the sweetest emotions of gratitude and joy.

## *AUGUST* 28.

### MORAL REFLECTIONS ON A CORN-FIELD.

THIS field, that now invites the sickle of the reaper, has been exposed to numerous dangers. Tempestuous winds howled above it, and the storm often threatened to level the bending ears with the ground. The divine providence hath nevertheless preserved it until this day. What a striking emblem of the Christian! We are destined for a harvest of ineffable glory; but how often do our hopes run the risk of being blasted! The tempests of adversity oft threaten to overwhelm us; but even these tempests themselves are necessary. The

weeds of vice are thereby checked and eradicated. Amid afflictions, our experience, our faith, our humility are increased and strengthened. Like the weak ears of corn we are often bowed down to the ground; but, happily for us, we are again raised and supported by the hand of our heavenly Father.

As the harvest approaches the corn ripens fast. The dew, the heat of the sun, and rain, concur to accelerate its maturity. O that each day might render us riper for heaven! Let us employ to this end every circumstance of our lives! Be my situation here below what it will, let me bask in the sun-shine of prosperity, or be chilled by the bleak blasts of adverse fortune, let the days be serene or overcast with clouds, all these vicissitudes should contribute to mature my piety.

The difference in respect to height between the light and heavy ears is worthy of remark. The former are tall, straight, and raise their heads above the whole field; but the latter bend with their own weight. This exhibits an exact representation of the two different sorts of the professors of Christianity. Do we not see some who are vain and arrogant, and who, possessing very little religion themselves, look down with contempt on their humbler brethren. Blinded by a foolish presumption, they disdain the means of salvation. Those, on the contrary, who are rich in Christian virtues, bow their heads, like the full ear, with humility, towards the earth. Be the good qualities possessed by the Christian ever so numerous, he ascribes them all to God.

All the corn that is to be cut down, is not equally good: tares and weeds are sometimes mixed with it. This may remind us of the state of those Chris-

Moral reflections on a corn-field.

tians on whom God has deigned to bestow his grace. Their natural corruption, like the weeds, frequently retards their progress in virtue. A corn-field is not only an emblem of an individual Christian, but of the whole Christian church in general. The impious, by their public and private sins, sow the seeds of wickedness. The great owner of the field permits them to remain for a season. His patience and forbearance are long exercised towards them, and he reserves the rigor of his justice till the great day of general retribution.

How the husbandmen hasten to collect the gifts of the Almighty. The sickle and the scythe cut down all before them. Thus death levels the high and the low, the righteous and the wicked. But what shouts are those which resound from the field! They announce the joyous harvest-home. On these occasions may our hearts as well as our voices be lifted up to God, from whom we receive every blessing. But what transport awaits us on the great day of his universal harvest! With what ineffable sentiments will our hearts overflow when we shall be admitted into the society of angels. Then shall we recollect with gratitude and joy the difficulties, dangers, and tempests to which we have been exposed, and the tender care of that Providence which watched over us, while our voices shall join to bless our great and general Father. In this cheering hope let us pass the time of our probation, and with ardent longing await the day of the harvest.

## *AUGUST 29.*

### OF SHELL-FISH.

SHELL-FISH, or testaceous animals, are very numerous. They reside in habitations formed of a matter more or less calcareous; and which, in some respects, may be considered as their bones. Some of these are univalve, that is, composed of one single piece; others are bivalve or multivalve, consisting of two, or of several pieces. The testaceous animals form two great families; the muscles, whose shells are composed of more than one piece, and the snails, whose shells are of one piece, and in general of a spiral form. The structure of the former is much more simple than that of the latter. The muscles have neither jaws, horns, nor head; all the parts that can be discovered in them being wind-pipes, a mouth, and sometimes a species of foot. Most of the snails, on the contrary, have a head, horns, eyes, mouth, and feet.

There is a great difference in testaceous animals with respect to generation. Some are divided into sexes, others are hermaphrodites, and in others again no distinctions of sex can be discovered. Some are oviparous, others viviparous. On their first entrance into life they are inclosed in shells; but as the animal grows, the shell, the interior of which is lined with a delicate membrane, increases not only in thickness, by means of lamina closely adhering to each other, but likewise in circumference; those of snails receiving from time to time the accession of new circumvolutions as they grow older. The shells are formed of a slime that exudes from the body of the animal, and gradually be-

comes indurated; but whether they increase in size by exterior accessions, or by a regular interior nutrition, is not ascertained; the former, however, appears the most probable. Most of the testaceous animals live in water, principally in the sea; some near the shore, others in the main ocean. Some are carnivorous, and some subsist on vegetables. Many reside at the bottom of the sea, and upon rocks. Oysters and various other shell-fish attach themselves, by means of a viscous cement, to different bodies, and are often found adhering in the same manner to each other. This adhesion in some species of shell-fish is a voluntary act, for they can fasten or disengage themselves, as circumstances may require. In others it is involuntary, as they remain immoveably fixed to the rocks to which they are attached.

Our knowledge of these animals is still extremely imperfect. The place of their abode renders it almost impracticable to make accurate observations on the generation, the growth, the mode of receiving nourishment, the motions, and a thousand other circumstances relative to these animals. Only three or four families of shell-fish have yet been discovered; but it is probable that many hundreds would be found, if it were possible to explore the abysses of the ocean, and the beds of rivers. Hitherto we have noticed only the agreeable variety of figures in shell-fish; but of the organization and mode of life of those animals, as well as the ends for which they were designed, we are almost wholly ignorant.

Let this portion of animated Nature excite our admiration of the infinite greatness of the Almighty. How immense is the extent of his empire! Every

corner of the globe teems with creatures, which, after their kind, bear the impress of the majesty of the Most High. Examine the shells of these animals, preserved in the cabinets of the curious; consider the varieties they exhibit in their dimensions, figures, and colors. Is not the finger of God obviously displayed in them, and should they not tend to convince us, that the ends which our Creator proposes invariably correspond with his divine majesty?

## AUGUST 30.

### OF THE GOVERNMENT OF GOD.

A DEITY who from his supreme elevation should look down as a passive spectator on all the revolutions that take place in the world, would soon cease to be an object of our adoration. Happily for us, the government of the God whom we worship embraces the whole extent of the creation. We every where find the centre of his empire, but can no where discover its limits. All his works are continually present to his view. At one glance he surveys the whole concatenation of the past, the present, and the future. Neither the most minute circumstance, nor the most trivial event escapes his notice; each forms a part of the plan which he has projected for the attainment of his wise and holy purposes, all of which ultimately tend to one point, that is, to afford his creatures the highest degree of happiness and comfort. Yes, Lord, thou takest an interest in all thy works, thou surveyest them at a glance, and governest them by thy nod. Thy

laws are order itself; joy and felicity flow from thy commandments.

His Providence preserves an uninterrupted succession of every species of creature which he formed at the beginning of the world. Animals die, and others supply their places. Generations of men pass away, and others spring up in their stead. He causes the inanimate to contribute towards the preservation and happiness of the living, and he has subjected all his creatures to that being who alone is capable of discovering him in his works, and of adoring his bountiful Creator. He who is holy wills also that his rational creatures should be holy. By the continual proofs which he gives of his love of that which is good, and his abhorrence of evil, he speaks to their hearts, and exhorts them to walk in his commandments. He directs their actions to his own ends; frustrates their designs when they are contrary to his views; and by his wisdom furnishes them with the means of avoiding the paths of iniquity. What wisdom did he not display in the measures which he used to conduct the children of Israel to the accomplishment of his purposes! In vain did the heathen, more than once, vow their destruction; they still continued to be a people. He omitted nothing to preserve among them the pure religion, which distinguished them from all the surrounding nations, enveloped in the darkness of ignorance and superstition.

But our God dwelleth in light inaccessible. The wisdom of his government is too profound to be fathomed by any one but himself. Human understanding is far too shallow to penetrate his designs,

before the event has unfolded them to our view; it is too limited to comprehend all the wise motives for his dispensations. The wicked is often seated among princes, while the righteous man languishes in the dust; guilt triumphs, and virtue is oppressed: the greatest of villains revels in the lap of fortune, and the favorite of heaven is bowed down by adversity. Nevertheless there is a Providence. Notwithstanding this apparent inconsistency, he is still the benevolent Father, the wise God, the just ruler of all his creatures. All his dispensations, however inscrutable, deserve our admiration. His counsels are wonderful; but all his plans are executed with supreme wisdom. All the vicissitudes of this life, incomprehensible as they may appear, tend to more remote ends. This yoke of misery under which you groan, will perhaps have the happiest influence on your future destiny. This apparent evil is perhaps an indispensable remedy for your soul; and on this chastisement depend, perhaps, the perfection of your faith, the purity of your heart, and your eternal felicity. Hear this, thou who art discontent with thy lot, and cease to murmur.

Why, O man, dost thou then strive to fathom the decrees by which God governs the world? With thy finite understanding canst thou hope to discover the views which guide the infinite Being in his dispensations? In the events that pass before thine eyes, thou art ignorant alike of what preceded, and of what is to follow them; and yet, wouldst thou presume to penetrate their causes, and to predict their effects? Providence is just in all its decrees, though thou mayst not on all occasions

perceive the motives of them; but to determine the cause of every dispensation, it is necessary that thou shouldst be what God is.

## *AUGUST* 31.

### HYMN FOR HARVEST.

OUR fields crowned with fruits and with abundant harvests, are as a song of praise to the Creator; the joy which sparkles in the eyes of the reaper is a hymn of praise to the God of Nature. It is he who causeth bread to spring forth from the earth, and who showereth upon us his benedictions. Let us assemble, my friends, and sing unto the Lord; let his praise ever be the subject of our songs. Let us listen to the words which he addresses to us from the bosom of our fields: "The year shall crown thee with its blessings, O world; thy happiness is my work. I called forth the spring, and the harvest is the work of my power. The fields which support thee, and the hills covered with corn, are mine."

O Lord, we behold thy majesty, and we feel the value of thy beneficence. By thee we exist; our life and our support are the gifts of thy hand. Blessed be the fields that afford subsistence to man! Flourish, beautiful meadows; be covered, ye forests, with thick foliage; and thou, O Nature, be ever bountiful towards us! Then, from the dawn to the close of day, the Lord shall be the subject of our praises. Free from care, we will rejoice in his blessings, and our children shall repeat after us: "The God of heaven is our Father; the Lord, the Lord is God."

## *THANKSGIVING*

### FOR THE PROVIDENCE OF GOD.

O LORD, my God, my Savior, my protector, my confidence, my help, and my salvation, thou art worthy to receive honor, and praise, and glory! My heart expands with gratitude to the Lord, and I will declare all his wonders. I will rejoice, and be glad in thee, and praise thy name, O Most High!

I thank thee for this immortal soul which thou hast created, which thou hast redeemed by the blood of thy Son, and which is sanctified by thy grace.

I thank thee for the body which thou hast given me, and which thou hast hitherto preserved in health and strength. I thank thee for my members, which yet move with such facility and promptitude, and for my senses, which are still perfect and unimpaired: I bless thee, O God of life, that I yet continue to exist.

I praise thee for the paternal care with which thou providest for my daily support, for the manifold blessings and benefits which thou hast conferred on me for the preservation, comfort, and pleasure of my life. I thank thee for those dear connections thou hast enabled me to form with friends, who are my delight and consolation.

I praise thee for the blessed hope that I shall once know, from happy and everlasting experience, in what consists the felicity of heaven.

I praise thee for the month that is now brought

to a close. O Lord, thou hast done great things for me; my soul rejoices, and shall bless thee for evermore.

## SEPTEMBER.

### SONG OF PRAISE TO THE MOST HIGH.

SING with holy rapture, sing a new song to our God! The Lord is great! I will celebrate for ever that Being who is all-bountiful and all-wise, and whose all-penetrating eye nothing can escape.

It was he who spread the starry heavens like a canopy over our heads; there, surrounded by the radiance of resplendent suns, he has established his throne; there he dwells in light inaccessible to mortals.

O God, I am lost in this splendor; but thee, thou Being infinitely good, I discover every where; thou art also present in the midst of thy creatures. Ravished with the wisdom of thy ways, and transported with admiration, I praise and exalt thy holy name.

I glorify thee, O Lord, who governest the earth with paternal care, who illuminest it with the beams of the glorious orb of day, who waterest it with rains, who refreshest it with dew;

Who coverest it with smiling verdure, who crownest it with flowers, who enrichest it with harvests, who each year renewest its decorations and thy blessings.

Thy cares extend to all that exists, and the meanest of thy creatures is an object of thy bounty. The young raven which, covered with snow, cries

to thee from the summit of a steril rock, is sustained by thy hand.

It is thou that causest refreshing streams to gush from the bosom of desert mountains, who directest the sun to ripen the grapes which embellish our hills, and the fruits that enrich our orchards. It is thou that sendest the zephyrs to disport in our forests.

Thy sun, when he arises to illumine the world with his radiance, summons all thy creatures to labor. All Nature is in action till the moment when the shades and the silence of night bring the desired repose.

No sooner does the day begin to dawn, than the choir of birds breaks the stillness of the groves with strains of gratitude and joy. Then all the nations of the world, from all the regions under heaven, raise towards thee a concert of praise.

To thee they chant the hymn of thanksgiving, O Father of all beings, who lovest them all, who showerest blessings on them all, who hast destined them all to happiness, provided only that they will be happy.

Let his name be glorified in all the worlds that compose his empire; let every voice join in one universal hymn to the Being all-bountiful and all-wise!

## *SEPTEMBER 1.*

### THE OMNIPRESENCE OF GOD.

THOU art every where present, O mighty God! Thou art near to me, and thou art afar off; thy presence filleth the universe. Here grows a violet;

yonder blazes a sun, and both are alike the objects of thy care. Thou art in the gentle breath of the zephyr, as in the rude blast of the tempest; thou walkest, O great and holy Being, in darkness as in light, and thy presence is diffused alike over an atom and a world. Thou art present in the flowery valley, and lendest an ear to the feeble accents of my praise, no less than to the immortal strains, accompanied by the harps of the seraphim, at the foot of thy throne. Thou who art my God, as well as the God of the seraph, thou listenest to the one as well as to the other; thou hearest also the joyous accents of yon lark that soars to heaven, and of the humming of this bee fluttering around the rose. Ah, then, thou Being who art every where present, if thou hearest me, condescend also to grant my request: let me never forget that thine eyes are upon me. Let me always think and act as though I were in thy presence, that when I am summoned with the world of spirits to appear before the tribunal of my judge, I may not have occasion to flee before him, or to call upon the rocks to cover me, and to hide me from his face.

## SEPTEMBER 2.

### BEAUTY AND VARIETY OF BUTTERFLIES.

LET us contemplate these pretty creatures before they are totally extirpated from the kingdom of Nature; perhaps they may excite reflections equally interesting to the mind and heart.

The first thing that engages our attention in butterflies is the dress in which they appear. In some of them, however, it is but mean; in others uni-

form, but neat and simple. Some have a few ornaments on their wings, but others are profusely adorned, and covered with beauties. To the latter class of butterflies we will devote our attention for a few moments. How beautiful are the stripes upon various parts of their dress, and the spots with which others are bestudded! With what delicacy has Nature painted them! But if my admiration is so great when I consider these insects with the naked eye, how will my astonishment be augmented when I examine this beauteous object with the microscope! Could any one have imagined that the wings of butterflies were furnished with feathers? And yet this is actually the case. What is commonly called dust, is found to be real feathers, arranged in the most admirable order. Their structure and symmetry are as perfect as their colors are brilliant. Those parts which form the middle of these minute feathers, and which are attached to the wing of the insect, are stronger; but those, on the contrary, that compose the exterior circumference, are much more fine and delicate. All these feathers have a quill at the lower extremity; but the upper part is more transparent than the quill from which it proceeds. If you lay hold of the wing too roughly, you destroy the most delicate part of the feathers; but if the whole of the feathers is removed, nothing is left but a thin skin, in which you may perceive the orifices in which the quills of the feathers were fixed. This skin is as different in texture from the wing itself, as fine lace to the linen to which it is fastened It is more porous, more delicate, and seems as if embroidered by the finest needle; it terminates in a fringe of uncommon beauty, the minute threads of which

succeed each other with the utmost regularity and symmetry. What is the finest work of human hands, compared with the dress of this insect? Our finest lace is as sail cloth, and our smallest thread as hempen cord, in comparison of the delicate tissue which covers the wings of the butterfly. Such is the prodigious difference which appears between the works of Nature and those of art, when viewed through a microscope. The former exhibit all the neatness and beauty imaginable; but the latter, even the most perfect of their kind, seem excessively coarse and unfinished. How fine a piece of cambric appears to us. Nothing can be more delicate than its threads, nothing more uniform than its texture; but in the microscope these fine threads resemble cords, and we should almost be tempted to believe that they were interlaced by the hand of a basket-maker, rather than woven in the loom of a skilful weaver.

The most wonderful circumstance relative to this insect, is, that notwithstanding all its gaudy decorations, it proceeds from a worm of the meanest appearance. See how the butterfly expands his glistening wings to the sun, how he sports in the beams, how he rejoices in his existence, how he flies over the meadow, tasting the sweets of every flower, and inhaling the balmy breath of spring. His gaudy wings display all the magnificence of the rainbow. How beautiful is he now! What a change he has undergone since the time when he crawled as a worm in the dust, in perpetual danger of being crushed to death! Who raised him from the earth? Who gave him the power of soaring into the air? Who furnished him with his variegated wings? It was God—that God who is his

creator as well as mine. In this wonderful insect he has given me an emblem of that change which awaits me. I too shall relinquish the form of a creeping worm, and shall be raised above the clouds; in a state of holiness and glory I shall soar unobstructed beyond all the constellations.

## *SEPTEMBER 3.*

### GROWTH OF TREES.

EVEY tree, notwithstanding the nutriment it receives from above from the extremities of the branches, is supplied from below with the principal portion of its aliment, and it appears as though it had a circulation of the juices similar to that of the blood in animals. The extreme points of the roots are an astonishing assemblage of spongy fibres and air-vessels, which are always open, in order to admit continually from the earth a proportionate quantity of sap. This sap is originally nothing but water impregnated with an earthy matter; but afterwards, by means of a milky fluid peculiar to each kind of tree, it is prepared and changed into a nutriment, and ascends into that part of the tree which is above the earth. By the aid of a microscope we find that what we call wood, is, notwithstanding its hardness, nothing but an assemblage of an infinite number of small, hollow fibres. Most of these rise perpendicularly, especially in young trees; but in order to give these fibres the greater consistency, certain trees, especially those that are designed to be particularly strong and hard, have tubes which run in a horizontal direction from the circumference to the centre. By the sun's heat the

sap is incessantly drawn upwards into the branches and their extremities, as the blood is impelled by the heart through the arteries into the extremities of the animal body. When the sap has performed its office, the surplus descends through large vessels situated between the interior and exterior bark, like the blood through the veins. Hence arises an annual addition, which increases the thickness of the tree. To convince ourselves of this, we need only cut a branch of a tree horizontally, and we shall be enabled to tell how many years it has been in attaining to its present growth. While the trunk is gradually increasing in height and bulk, the roots also are striking downward in the same proportion. With respect to the exterior bark, it seems designed to serve as a kind of clothing to the tree, to unite its parts firmly together, and to preserve the more delicate, but essential ones, from external injury, and from the pernicious influence of the air.

Thus hath the all-wise Creator formed an admirable system of solid and fluid matter, in order to preserve the life and promote the growth of trees, that may adorn our plains, afford shade to our flocks and herds, and shelter to our habitations, and serve when they are cut down for so many useful purposes. Herein we discover a never-erring wisdom, which prescribes to Nature laws that are in certain respects immutable, and continue to act without interruption under the eye of Providence. Such profundity of wisdom, such combinations of art, and such a multitude of preparations for each tree—what astonishment and veneration ought they not to excite! The contemplation of this wisdom is a delightful employment for the understanding, and

and impels us to glorify that God who is so great in his counsels and his plans, and so wonderful in the execution of them. The more traces we discover of the divine wisdom, so much the more we should be encouraged to commit all our concerns into the hand of him, who can never want means to direct all things for our advantage; and to look up to him to supplicate him to enrich our souls with wisdom, and to cause them to grow in grace.

O that I may resemble a tree in all these respects! May I daily grow in virtue, and may I bear fruits externally according to the station assigned me, and the faculties with which I am endowed. May I at the same time grow internally; may my soul acquire vigor and strength sufficient to encounter all the storms of adversity, and to preserve in me the needful humility. But so much the more anxious should I be, that I may not resemble an aged tree, whose growing roots attach it more and more strongly to the earth. The nearer I approach to the grave, the less may my affections be fixed on the earth.

## *SEPTEMBER 4.*

### THE LION-ANT.

No insect is more celebrated for its dexterity than the lion-ant, though its structure would appear to promise very little. In form it nearly resembles the wood-louse. Its body, provided with six legs, terminates in a point, and is composed of several annular articulations. Its head is square, flat, and armed with two hooked, moveable horns, the singular structure of which shews how admirable Nature is, even in her smallest works.

The lion-ant.

This insect is the most subtle and dangerous enemy of the ants. The preparations which he makes to ensnare his prey are extremely ingenious. He forms a hole in the shape of a funnel, where he lies in wait for the ants that may chance to come beyond the edge of the precipice. To make this pit, he first traces in the surface of the sand, a large circle, which is to mark the circumference of the mouth of the funnel, and is always proportioned to the depth of the hole. This done, he buries himself in the sand near the edge of this circle, and carefully throws up the sand above him, beyond the circumference of the circle. This labor he performs with his head, as with a shovel; its flat, square figure being admirably adapted to the operation. The insect continues his work till he has arrived at a sufficient depth. Sometimes in digging he meets with grains of sand of larger size than usual, or small lumps of dry earth, which he will not suffer to remain in his funnel. These he throws out of his hole by a rapid and well-timed motion of the head. If he finds bodies of larger size, he endeavors to push them out with his back; and in this labor he is so assiduous, that, if he fails, he will repeat the attempt six or seven times.

The lion-ant at length enjoys the fruits of his toil. His nets being once laid, he lies in ambush for his prey. He buries himself at the bottom of his pit among the sand, leaving no part above the ground but the tips of his two horns; and in this condition he waits motionless for the prey which he is unable to pursue. When an ant, or any other insect of the kind, chances to walk over the edge of the pit, its steps throw down a little of the sand, which, running to the bottom, gives

the enemy notice of the stranger's approach. He then throws up the sand which covers his head, to bury the ant, and bring her down with its returning force to the bottom. All the endeavors of the unfortunate insect to escape, when once she is within the verge of the pit, are unavailing; for, as she attempts to climb, the sand runs away from under her feet, and its motion informing the enemy where she is, he directs fresh showers of sand to the spot, till at length the victim falls to the bottom between his horns. He then plunges the points of them into the ant's body, and having sucked all the juice out of his prey, throws the empty skin as far from the hole as he can. This done, he mounts upon the edges of his pit, and, if it has suffered any injury, repairs it with great care, and immediately buries himself again in the centre to wait for another meal.*

All the actions of this insect display such admirable art, that we cannot easily be weary of ob-

* One singularity in the formation of this animal is too remarkable to pass unnoticed. His horns are his only organs for receiving nourishment; he never brings any animal which he has seized near his head, but always holds him at the tip of his horns. They consequently serve as syringes, to draw into his stomach the juices of the bodies of the insects on which he feeds; for there is neither any mouth, trunk, nor any other organ about the head that could serve the purpose of eating; the head seeming intended only to throw away the sand out of the pit.

This insect, after living some time in the state in which it displays so much ingenuity, buries itself under the surface of the sand, incloses itself in a web, and passes first into the state of a nymph, and then into that of a fly, resembling the dragon-fly; in which state only it couples and perpetuates the species by means of eggs. T.

serving them. The lion-ant is employed in preparing a pit, before he has seen the insect designed for his food; and yet all his actions are regulated in the manner best adapted to provide for his subsistence. How could so slow an animal as the lion-ant ensnare his prey more easily than by digging a sloping den in the loose sand? What better stratagem could he have devised for securing the insects struggling on the brink of this artfully constructed snare, than to overwhelm them with showers of sand? These actions must therefore have fixed principles by which they are governed. His pit must necessarily be dug in sand, otherwise it would not be proper for taking his prey. From the structure of his body he must necessarily work backwards, and excavate his pit by shovelling out the sand with his head, otherwise he could not accomplish his purpose. These various instincts of the lion-ant announce an author who knew and provided every thing necessary for the preservation and well-being of this animal. The sagacity which this insect displays was not acquired by experience, but it is innate. It must therefore originate in the wisdom, power, and goodness of that Being, who has adapted the instincts of animals to their wants.

These reflections excite me anew to praise thee, the Creator of this minute insect, as well as of man. With that beneficence which thou hast displayed throughout the whole circle of the animal creation, thou hast furnished this insect with all the means requisite for the enjoyment of life. By the instinct which thou hast implanted in an insect, otherwise so impotent, thou hast enabled it to attain an intelligence nearly approaching to reason, and in some respects surpassing it. And what is thy design in all

this, but to afford us opportunity and encouragement to study thee, even in the minutest of thy creatures. To this purpose then will I apply this portion of natural history. Every insect, however insignificant it may appear, shall direct my thoughts to thee, who has made the most diminutive worm as well as the unwieldy elephant, and providest with equal benignity for the one and for the other.

## *SEPTEMBER 5.*

### RESEMBLANCE BETWEEN PLANTS AND ANIMALS.

IT is more difficult than might be supposed to determine precisely the difference which exists between plants and animals; for Nature descends by imperceptible gradations from animal to vegetable existence; and to distinguish the exact limits of these gradations would require the penetration of an archangel. So much, however, is certain, that notwithstanding all the difference observable between these two species of organized bodies, there are yet many points in which they bear a resemblance to each other.

The seed is to the plant what the egg is to the animal. From the former issues the stalk, which was before concealed under the coats of the seed, and shoots up above the ground, as the animal in the egg bursts the shell, and works its way into the open air. The eye, or bud, is to the plant as the embryo to the animal. This eye does not pierce through the bark till it has attained a certain size, and even then remains attached to it, that it may receive nourishment from the bark and the fibres of

the branch. The embryo in due time bursts from its confinement in the womb into the light of day, where, however, it would soon perish, were it not nourished by the mother. The plant is nourished by various alimentary juices conducted to it from without, and which, passing through numerous tubes and vessels, are, at length, incorporated into its substance. The nutrition of the animal takes place in the same manner. The latter likewise receives its nourishment from without, and after it has passed through many vessels of different kinds, it is transformed into animal substance. The fecundation of the seed is effected by the dust of the stamina penetrating into the pistil; as the fructification of the animal is produced by the introduction of the seminal liquor into the ovary or matrix. Plants may be multiplied, not only by means of the seed and eyes, but also by slips. In like manner animals are propagated, not only by eggs and living young, but also by cuttings, as in the class of the polypi. The diseases of plants sometimes proceed from external, sometimes from internal causes; the same is the case with respect to the diseases of animals. At length death takes place in plants as well as in animals, when old age has indurated and obstructed the vessels, and has consequently stopped the circulation of the juices. Plants and animals have one and the same abode. The surface and the interior of the earth, the air and the water have their peculiar vegetables and animals. The earth teems with both, though the former are not so numerous as the latter. The measure of the largest trees nearly approaches that of the largest animals.

Resemblance between plants and animals.

We might almost be tempted to consider the animals and plants as beings of the same class, in which Nature appears to have made an almost imperceptible transition from the one to the other. So much is certain, that some general and essential resemblances have been perceived between the two kingdoms, but that no general and characteristic difference has yet been discovered. If, however, there subsists any distinction between animals and plants that has not yet been observed, it is incontestable that Nature has divided her works by such delicate lines, that the human mind can scarcely discern them. Who can tell what discoveries are reserved for posterity! Perhaps future ages may bring to light plants whose qualities bear a still greater resemblance to those of animal bodies; perhaps they may become acquainted with animals more nearly allied than the polypus to the vegetable kingdom.

Let us, my dear reader, make use of these truths for the purpose for which all the truths of nature and revelation are given to us, that is, to glorify God, and to strengthen our minds in virtue. Let the striking resemblance subsisting between plants and animals impress us with the power and wisdom of that Being who has stamped upon all created objects a certain character of infinity. But let it also teach us a lesson of humility. We partake of the nature of plants and animals, and to the religion of Jesus alone it is owing that we are placed between the animals and the angels. Let us seek by means of piety to approach nearer to the level of the celestial spirits; and as we are endowed with the faculty of attaining a certain degree of resem-

blance to the Being of beings, let us endeavor to gain that exalted felicity. Let us continually bear in mind what we are, and what we are one day destined to be.

What a wonderful creature is man, who, like the brutes, derives his sustenance from the earth, and is endued with reason like the angels; one half of whom perishes like the meanest animals, while the other half is destined for immortality; created to walk in the paths of holiness, to enjoy perfect freedom of will, but yet to be subject to God, to praise him for ever, and to enjoy eternal felicity!

## SEPTEMBER 6.

### OF THE NATURE AND PROPERTIES OF SOUND.

ALL sound is produced by means of the air; but the air could not produce sound unless it were set in motion. Every agitation of the air, however, does not produce sound, otherwise all wind would be attended with noise. To form sound, the air by means of its elasticity must be suddenly broken, and as quickly come into contact again, which produces a tremulous and vibratory motion, like the undulations and circles in water when a stone is thrown into that element. But if this vibratory motion were confined to those particles of air which have been compressed, the sound would not be transmitted to our ears. Hence it is necessary that one particle of air should communicate the vibration to another in every direction. Thus the last vibration is communicated to the air immediately surrounding the ear, and the perception of sound is produced. Sound is transmitted with asto-

nishing velocity, travelling at the rate of one thousand one hundred and forty-two feet in a second, or about thirteen miles in a minute. This calculation, verified by a great number of experiments, is of considerable utility in numerous cases. When we know with what velocity sound flies, we shall not feel any unnecessary alarm during storms of thunder. We have only to count the seconds, or the strokes of the pulse between the lightning and the thunder, and we shall know the precise distance of the danger. By the same method the distance of a ship at sea, or of one place from another, may be ascertained. It is worthy of remark that a weak sound travels with the same velocity as one that is ever so loud. The agitation of the air is, however, greater in proportion to the force of the sound, because a larger mass of air is put in motion. A sound, therefore, is loud, when a great quantity of air is agitated, and low when that agitation is confined to fewer particles.

But what benefit could I derive from these observations, which philosophers have been at so much pains to make on the properties and effects of sound, unless the structure of my body were adapted to the perception of sounds? My soul is therefore filled with unfeigned gratitude to thee, O my God, who hast not only so constituted the air as to produce sound by its vibrations, but hast also provided my body with an organ susceptible of the impressions of sound. A delicate and elastic membrane, stretched over the bottom of my ear, like the parchment over a drum, receives the vibrations of the air, and hence arises the faculty of apprehending every species of sounds. Thus far our knowledge extends; but when we ask how it

happens that a word which is pronounced, is impressed as a word, and not as a mere sound upon the brain, and how a tone can operate upon our souls, and create such a variety of ideas, we are compelled to acknowledge our ignorance of these phenomena.

Let us rest satisfied in the conviction of the wisdom and the goodness of our Creator in this, as in every other dispensation. Did not sound exist, all mankind would have been dumb, and in point of knowledge we should resemble infants before they can speak. By means of sound every creature is enabled to express its wants, or to communicate its happiness. Man, however, enjoys exclusively many valuable prerogatives. By sound he can make known all the most secret emotions of the heart, and by certain tones he can excite all the passions of the soul. God has not only conferred on us the faculty of apprehending sounds by the ear, but has furnished us with various means of preserving that faculty. When one ear has received injury, the other is still capable of performing its functions. When the sense of hearing declines, it may be assisted by a horn: and even if the exterior auditory channel be obstructed and injured, it is possible that the interior passage which opens into the mouth, may remain perfect and unimpaired.

What is still more, the Creator hath in this dispensation provided for our pleasure. What a variety of musical instruments are capable of delighting us; and how nicely we can discriminate between the discords and concords of each! Our auditory nerves transmit to us with the greatest fidelity the tones of an infinite number of sonorous bo-

dies. With what grateful sensations my heart overflows, O bountiful Creator, when I consider the blessings thou hast conferred upon me. Let me never forget the magnitude of my obligations to thee. My songs of praise shall be heard as far as sound can perpetuate its vibrations. Earth and heaven shall know that thou hast done great things for me!

## *SEPTEMBER 7.*

### MYSTERIES OF NATURE.

WHENEVER man attempts to penetrate into the causes of things, he is made sensible how weak and how limited is his understanding. Our knowledge of Nature, of which we are sometimes so vain, seldom extends beyond an acquaintance with a few of the effects of such things by which we are immediately surrounded, and the application of them to our advantage, as far as our faculties permit. But the causes of these effects, and the manner in which they are produced, generally remain an impenetrable mystery. There are a thousand phenomena in Nature which are not perceptible by human eyes; and in those which we are enabled to comprehend, a degree of obscurity generally prevails, to remind us that we are but men. There are many natural phenomena, of whose immediate causes we are ignorant; those of many others are still doubtful, and in very few instances can we pronounce with certainty concerning them.

We hear the wind blow, we witness its powerful and manifold effects, but we know not exactly what produces it, what augments its violence, or what

appeases it.—From a small grain we see leaves, a stem, and ears spring forth, but we are ignorant by what means. Still less can we comprehend how a little seed can produce a plant, and how that plant can increase to a lofty tree, beneath whose shade the birds of heaven build their nests, affording foliage and flowers for our gratification, fruits for our nourishment, and wood for our various wants and conveniencies.—All the alimentary substances which we use, be their nature ever so incongruous, are transformed, by an incomprehensible process which takes place within us, into flesh and blood. —We see the wonderful effects of the loadstone, we imagine that it must contain a certain principle which produces these effects, but whether it acts by means of a fluid circulating around it, or by an intrinsic power of attraction, we cannot determine. —We feel the cold, but the actual cause of it no naturalist has yet been able to discover.—We have more correct notions respecting the origin of thunder and lightning than our ancestors; but what is the nature of the electric matter, which bursts with awful magnificence from the bosom of the storm?— We know that the eye can perceive the objects whose images are painted upon the retina, and that the ear can apprehend the vibrations of the air, but what are those perceptions, and how are they produced?—We are convinced of the existence of a soul in the body; but who can explain the nature of their union, and of their reciprocal influence?— The effects of air and fire are continually present to our view; but we are unacquainted with the real principle of these two elements, their constituent parts, and the manner in which most of their effects are produced.—In the majority of cases we

have no sure and incontestable grounds to build upon, and are obliged to be content with conjecture: but what else are the hypotheses and systems of the philosophers, but so many tacit confessions that they know little or nothing about the matter? At every step we take we discover in Nature an ocean of wonders, and however profound may be our researches, we find an infinite number of things which baffle all our penetration. Time, indeed, may unexpectedly remove the veil from various phenomena; but the first causes, their nature, and mode of operation, doubtless lie beyond the sphere of our limited intelligence.

The mysteries of Nature may daily impart to us lessons of wisdom with respect to the mysteries of religion. In the natural world God has conferred on us the means that tend to the happiness and comfort of our mortal life, though he has concealed their origin and their causes from our view. Thus also in the kingdom of grace he has presented to us the means of spiritual and eternal life, though their nature and the manner in which they operate are not revealed to us. Is there any one who would refuse to eat and drink, till he could comprehend in what manner food preserves his life and strength; who would not sow or plant, till he could understand the causes that produce vegetation; who would not make use of wool for his clothing, till he knew what occasions the sheep to be covered with it? Man cannot be guilty of such folly. He observes, on the contrary, the operations of Nature; he learns from experience their consequences, their utility, and advantages; and avails himself of them, with gratitude to his Creator. But why do not men act with the same prudence in what relates

to the mysteries of grace? Many refuse to make use of the means provided by God for their salvation, till they have investigated their nature, their mode of operation, and their efficacy. Short-sighted mortals involve themselves in disputes on these questions, and in the mean time neglect the salutary use of the means of grace. O that we were as wise in spiritual as we are in temporal things. Instead of enquiring whether this or the other point of divine revelation is reasonable or possible, let us rather avail ourselves of the means of salvation which God has vouchsafed to grant us, without entering into unprofitable disquisitions on their nature and efficacy. If we meet with things which we cannot fathom and comprehend, let us acknowledge the weakness of our understanding, and receive them with humility. It is sufficient if the advantage we derive from the faithful application of them, teaches us that they are the dispensations of a Being infinitely bountiful and infinitely wise.

Far be from me the presumptuous design of prying into the mysteries of the Almighty in the kingdom of Nature and grace, or the temerity to find fault with them. When I meet with mysteries of this kind, may they, on the contrary, fill me with consciousness of my circumscribed understanding, and impress me with the majesty and greatness of the Creator of all things! Then will each of these mysteries excite me to adore the Lord, who is so wonderful in all his works.

## SEPTEMBER 8.

### EYES OF ANIMALS.

THE mere examination of the eyes of the different species of animals is sufficient to convince us of the wisdom with which God has formed the bodies of his creatures. He has not conferred this sense on all animals in the same manner, but has diversified the organs in the mode best adapted to the wants of each species of animal. I invite you, my dear reader, to reflect with me on this subject, and promise you in this contemplation one of the purest pleasures of which the human mind is susceptible.

The eyes of most animals resemble each other in this point, that they appear to be round; but in this apparently circular figure a great diversity is observable. Their position in the head, where they are nearest to the brain, which possesses greater sensibility than any other part of the body, is subject to innumerable variations, depending on the wants and comforts of the animals. The eyes of man and most of the quadrupeds have each six muscles, to enable them to move it in different directions. The position of the eyes is such, that they can look straight forward, and embrace nearly half a circle; but in this respect they vary. Horses, oxen, sheep, swine, and the greater number of the quadrupeds, have a seventh muscle, which is probably designed to keep the eyes of these animals, who seek their food with their head inclined towards the ground, from projecting too far from their orbits. The eyes of frogs differ from those of men in having a membrane with which the animal

can cover them at pleasure. This membrane, which, though thick, is nevertheless transparent, protects their eyes from the dangers to which their residence sometimes in the water, and at others on land, would expose them. Flies, gnats, and other insects of the same class, enjoy a more perfect sight than other creatures. They have as many eyes as there are perforations in the cornea. While other animals that have but two eyes are obliged to turn them by means of the muscles, these insects, from the number of their eyes, have always some of them directed to the surrounding objects. The fishes, which live in a denser element than we, would be blinded by the strong refraction of the rays of light, unless their crystalline humor was nearly spherical, the better to collect and concentrate those rays. They have no eye-lids, neither can they draw back their eyes; but their cornea, which is almost as hard as horn, protects them from every danger. The mole was formerly supposed to be blind. This animal, however, has small black eyes, but which are not larger than the head of a pin. As he principally resides under ground, it is necessary that his eyes should be small, sunk deep in the head, and covered with hair. The eyes of snails are, it is well known, placed at the extremity of two long horns, which they can draw in or protrude above their heads, in order to embrace a large field of view, and to discover distant objects. In some animals which have not the power of moving their eyes or their head, this defect is compensated by the multiplicity of eyes, or in some other way. Spiders have four, six, or eight eyes, all placed in the front of their head, which is round and without neck. They

are transparent, and sparkle like diamonds. According to the different necessities and mode of life of certain species of spiders, these eyes are distributed in various ways in their head, that without moving it they may immediately discover the flies, which form the principal part of their subsistence. The eyes of the cameleon, a species of lizard, possess this extraordinary property, that he can move one without the other, so that he can at the same time look before and behind him, and turn one upward while the other is fixed on the earth. The same faculty is observed in birds, hares, and rabbits; it not only preserves them from many dangers, but enables them to discover their food with greater ease.*

* Dr. Monro, in his *Comparative Anatomy*, has some excellent remarks on the subject of this article; and having considered it in some points of view different from what the author has done in these reflections, the reader will not be displeased to find those observations subjoined:

"All quadrupeds have," he observes, "at the internal canthus of the eye, a firm, strong membrane, with a cartilaginous edge, which may be made to cover some part of their eye; and this is greater or less in different animals, as their eyes are more or less exposed to dangers in searching after their food. This *membrana nictitans*, as it is called, is, however, not very large in all these animals. Cows and horses have it so large as to cover one half of the eye like a curtain, and at the same time it is transparent enough to allow abundance of the rays of light to pass through it. Fishes have a cuticle always over their eyes, as they are ever in danger in that inconstant element, the water. In this, therefore, we may observe a sort of gradation.

"All quadrupeds have a seventh muscle belonging to the eye, called *suspensorius*. It surrounds almost the whole optic nerve, and is fixed into the sclerotic coat as the others are. Its use is to sustain the weight of the globe of the

How strikingly is the tender care of Providence for the preservation of the most necessary organs of

eye, and to prevent the optic nerve from being too much stretched, without obliging the four strait muscles to be in a continual contraction, which would be inconvenient: at the same time this muscle may be brought to assist any of the other four, by causing one particular portion of it to act at a time.

"The next thing to be remarked is the figure of the pupil, which is different in different animals, but always exactly adapted to the creature's way of life, as well as to the different species of objects that are viewed. Man has it circular, for obvious reasons, an ox has it oval, with the longest diameter placed transversely, to take in a larger view of its food: cats, again, have theirs likewise oval, but the longest diameter placed perpendicularly; they can either exclude a bright light altogether, or admit only as much as is necessary. The pupil of different animals varies in wideness, according as the internal organs of vision are more or less acute: thus cats and owls, who seek their prey in the night, or in dark places (and consequently must have their eyes so formed that a few rays of light may make a lively impression on the retina) have their pupils in the day time contracted into a very narrow space, as a great number of rays would oppress their nice organs; while in the night, or where the light is faint, they open the pupil, and very fully admit the rays.

"The posterior part of the choroid coat, which is called the *tapetum*, is of different colors in different creatures. Oxen, feeding mostly on grass, have this membrane of a green color, that it may reflect upon the retina all the rays of light which come from the objects of that color, while other rays are absorbed: thus the animal sees its food better than it does other objects. Cats and owls have their tapetum of a whitish color; and for the same reasons have the pupil very dilatable, and their organs of vision acute: and we shall find that all animals see more or less distinctly in the dark, according as their tapetum approaches nearer to a white or black color. Thus dogs, who have it of a greyish color, distinguish objects in the night better

the senses displayed in these examples! The Creator has been pleased to communicate the inestimable blessing of light in manifold ways to his creatures. It is impossible to withhold our admiration of the art with which he has accomplished this design, and of the precautions which he has taken to secure to his creatures the possession of this precious organ. All the parts of their bodies are arranged in the manner best adapted to their nature and destination. In no individual animal could the position, the structure, the number, or the figure of the eyes be different from what they are, without manifest danger to the life of the animal, without subjecting it to great inconvenience, or even totally changing its destination. It was not merely for ornament or decoration, but for the benefit and the well-being of animals, that the Creator made such a difference in the structure and arrangement of their eyes. One of his purposes in this was, to teach us to discover his wisdom in every object. To this end, my dear reader, apply this meditation. If you reflect on this design of the Almighty, it cannot but excite you to celebrate his goodness and his omnipotence.

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than man, whose tapetum is dark brown, and who, I believe, sees worst in the dark of any creature; it being originally designed that he should rest from all kinds of employment in the night time. The difference, then, of the color of the tapetum, as indeed the fabric of any other part in different creatures, always depends on some particular advantage accruing to the animal in its particular manner of life from this singularity." T.

## SEPTEMBER 9.

### OF FISHES.

WHO could have conceived the existence of such creatures as fishes, if he had not seen them? If a naturalist had only made himself acquainted with those animals which inhabit the surface of the earth, and he were to be told that there existed in the water a class of creatures formed in such a manner as to live, move, propagate, and perform all the animal functions with ease and pleasure in that element, would he not have treated the account as a dream? From the effects which immersion in water produces on the human body, would he not have argued that the thing was impossible?

In truth, the mode of life of fishes, their structure, their movements, their method of propagation, are extremely curious, and afford an additional proof of the omnipotence and wisdom of our supreme Creator. To enable these animals to live in water, it was necessary that their bodies should be organized, in their essential parts, in a very different manner from those of the inhabitants of the land; and this we find to be the case, if we examine the structure, both interior and exterior, of the bodies of fishes. Why did the Creator give to the greater number of fishes a long, narrow, and pointed figure, unless to facilitate their motion in the water, and to enable them to cut their way through that denser element? Why are they provided with scales of a horny nature, except to preserve their bodies from injury by the pressure of the water? Why are different kinds of fishes, especially such as have very soft scales, or none at

all, covered with a certain viscous matter, unless to afford them some protection against cold and other incidents? Why have they gristle instead of bones, but that their bodies might be more pliant and flexible? Why is the crystalline lens of a spherical form in the eyes of all fishes, and why are the latter sunk so deep in the head, but that the light may be concentrated, and that they may be so much the more secure from injury of every kind? It is evident that in the structure of all these parts the Creator had a view to the mode of life and destination of these animals.

These, however, are not the only objects worthy of notice in the structure of fishes. Their fins are their only members, but by means of them they perform all their motions. By the tail fin they move forward; with the dorsal fin they guide their bodies; the pectoral fin enables them to rise, and with the ventral fin they keep themselves in equilibrium. The organs of respiration are the gills, situated behind the head; there are four on each side, and the uppermost are the largest. By means of these gills they draw breath by taking in the water at the mouth; and discharge it through their gills, which is their expiration. The blood which is conducted by the great veins from the heart to the gills, is not conveyed back through the lungs to the heart, as in land animals, but is distributed through the different parts of the body. One of the organs most essential for fishes in swimming is the bladder, situated in their belly, and communicating by a particular passage with the stomach. By means of this bladder they can make their bodies heavier or lighter. When it is inflated the fish becomes lighter, and consequently ascends; but when

it is empty, the body of the animal being heavier than the water, it naturally sinks. This is proved to be the case by the following experiment: if the bladder be pricked with a pin, the fish immediately sinks to the bottom, and cannot rise again to any height in the water, and much less to the surface.

Are not the prodigious multitudes of fishes and the great diversity of their forms also worthy of admiration? In the waters of Germany alone there are more than four hundred species. How great must be the number of individuals belonging to each species! Their figure is also very different. We find among the fishes not only the largest, but likewise some of the most diminutive of animals. Some are long, and as slender as a thread; others broad and short; others flat, cylindrical, round, triangular. These are armed with a horn, those with a sword, and a third species with a kind of saw. Some spout up the superfluous water they have swallowed, through the nostrils, to a very great height.

What ought I most to admire in all this, the omnipotence and wisdom of my Creator in the formation and preservation of these animals, or his bounty in rendering them subservient to our support? Both should excite an attentive observer of the works of God to glorify his name. O how great art thou, my Creator, how great in all the elements, how great in all the animals, whether they inhabit the air, the earth, or the waters; in the whale, whose huge back projects like an island above the surface of the ocean, as in the gold-fish that glistens in the vase. How beneficent art thou toward mankind in all thy dispensations! What a store of provision should we lose, if thou hadst not peopled those

prodigious plains, which produce neither trees nor fruits, with creatures so prolific and so delicious, and which largely contribute to the supply of our wants!

## *SEPTEMBER* 10.

### OF THE PROPAGATION OF ANIMALS.

IT was in ancient times believed that vermin might be generated by putrefaction, without the interposition of parents of the same species; but this opinion, which reason alone contradicts, is refuted by the most irrefragable experiments. On the contrary, it has been found that animals only are capable of propagating their kind. This propagation is effected in two ways, either by the production of eggs, or of living young. All the mammalia, or animals that give suck, are viviparous; all the birds are oviparous; but their eggs must be impregnated by the male, otherwise they are unfit for the propagation of the species. In most animals it is indispensably necessary that the female should be impregnated by means of copulation. The numerous class of fishes are, however, an exception to this rule. As far as we know, they do not copulate, but the male is supposed to impregnate the eggs which the female has spawned, by discharging his milt upon them. Fishes are the most prolific of all animals. When we consider how many millions of herrings are caught every year, we cannot help wondering that there should be any yet left behind. Some idea may be formed of their prodigious multiplication, when it is known that the pike lays more than three hundred thou-

sand eggs; the carp above two hundred thousand, and the mackarel near half a million. Among the fishes some few species are viviparous. Most of the amphibious animals copulate in the usual manner, but some fecundate the eggs of the female in the same way as the fishes. Some of them are viviparous, and others oviparous. The latter, however, do not hatch their eggs, but leave them to the heat of the air, water, sand, or mud. Of the worms some produce their young alive, and others lay eggs. Their generation is attended with many remarkable circumstances. Most, or perhaps all of them, are of both sexes at once, and either impregnate themselves, or reciprocally fecundate each other. In most insects there is an evident distinction of sexes, but in some no difference can be observed, and others seem to unite both sexes in one animal. The greater number of insects are oviparous, but some are viviparous. Their eggs are hatched by the warmth of the atmosphere. In this class of animals we remark a singular circumstance, which at the first view would lead us to believe that there is no copulation. An aphis generally produces her young alive. When one of them is separated at the time of its birth from the society of the rest of its species, still it engenders and brings forth young. This is explained by the following facts. In spring and summer they produce young alive, and without copulation. In three weeks one single insect will bring forth one hundred. All that are born during this season are females; the males are produced in autumn; at this time they copulate, and the females afterwards lay eggs, which are hatched in spring. Thus a single copulation is suf-

ficient for ten generations of insects, the individuals of which are impregnated with the egg in the body of their general mother.

When I reflect on all these different modes of propagation in animals, I discover most astonishing proofs of the power and wisdom of God. The instinct which impels the sexes to unite, is, in the first place, truly admirable. This propensity, implanted in every animal, is not produced by external causes. It is manifested with equal force in those that live in solitude, and in such as are gregarious. The wisdom of the Creator is likewise displayed in this, that the females have, in general, their appointed time for procreation. For instance, the rutting time of wolves and foxes is in January, of horses in summer, of stags in September and October. The insects copulate in autumn, the birds, and many species of fish in spring, the wild goats in September, and cats in January, May, and September. If the animals had not fixed times for copulating, the breeds would be confounded, and the propagation checked. Is it not a miracle of wisdom, that as long as the various species of animals enjoy their natural liberty, no such intermixture takes place as might cause them to degenerate, or the original race to be extinguished from the earth? Is it not worthy of admiration, that in all the species of animals the parts of generation are so exactly adapted to each other, that they could not have received the form they have for any other purpose than the union of the sexes? What a multitude of particular ends all terminate here in one general object! What combinations and harmony in the means! In a word, what a multiplicity of

wise ordinations, tending to one grand purpose, that is, the continual preservation and multiplication of every species of animals.

What must be the infatuation of those who, in all these arrangements, refuse to acknowledge the wisdom of divine Providence, and substitute blind chance in its stead! In the pleasing hope that you, reader, do not belong to the number of those senseless mortals, I address myself to you, and exhort you to reflect on the inscrutable wisdom of God, manifested in the propagation of animals. What delight will this contemplation afford you, when you perceive that it is for the benefit of the world that he has so wisely provided for the preservation and multiplication of animals.

## *SEPTEMBER* 11.

### INFLUENCE OF THE MOON ON THE HUMAN BODY.

In former times certain influences were ascribed to the moon, that strongly tended to cherish superstition and ill-grounded fear. The gardener did not plant till he had made observations on the moon, and the husbandman would not sow till he was assured of the favorable influences of that planet. The sick watched with superstitious accuracy the changes of the moon, and even physicians themselves paid regard to them in their prescriptions. These prejudices the world has gradually renounced; at least the empire of superstition, as far as respects the influences of the moon, is not so widely extended as it formerly was. This is one of those advantages enjoyed by the present age which we are apt to overlook, but for which we have abun-

dant reason to be thankful to the Almighty. In order to diffuse this blessing still more in the world, it is our duty to contribute, as far as lies in our power, to the extirpation of this species of superstition.

With respect to the influence of the moon on the human body, the safest way will be to chuse the middle path; for totally to deny her influence would be as irrational as to attribute to it extremely powerful effects. It cannot be denied that the moon produces great changes in the atmosphere; accordingly we cannot but think it possible that it may occasion changes equally great in our bodies. The moon may cause such an agitation in the upper regions of the atmosphere as to produce winds, heat, cold, vapors, fogs, and other phenomena upon the earth. If this be the case, the health of our bodies may be considerably affected by the influence of the moon. It is accordingly observed that persons afflicted with certain disorders experience more acute pains at the new and full moon. This is not surprizing; for if it be true that cold, damp, foggy, and tempestuous weather produces very different effects upon our health from those of a warm, dry, pure, and serene air, the moon may have a considerable influence upon our constitution, since she can occasion all these changes in the atmosphere. The action of this planet on the human body is founded on a principle which cannot be disputed. Our health depends in a great measure on the state of the weather and of the atmosphere, and no one can deny that the moon is capable of producing very great variations in both. Perhaps there may even be in the human body an ebb and flood proceeding, like that of the ocean, from the

operation of the moon. The monthly evacuations to which one half of the human race are subject, and which are incontestably governed by the moon, favor this conjecture. All those who are troubled with spontaneous effluxes of blood, will observe that they occur at stated periods, which are governed by the changes of the moon. Why should all diseases of a periodical nature recur every four weeks, rather than at longer or shorter intervals, unless they had some relation with the influences of the moon on the human body?

In general it is a principle which we ought to admit, to the honor of our all-wise Creator, that in all natural things there is a certain connection, capable of producing manifold effects on the bodies of animals. The atmosphere doubtless contains many wonders that are yet unknown to us, and which indisputably occasion great variations in Nature. Who knows but that many phenomena in the corporeal world, which we falsely ascribe to other causes, may be produced by the moon? Perhaps the light reflected by this planet in the night may be one of the least important ends for which it was created. Perhaps the moon is placed so near to the earth, in order to produce certain effects which the other celestial bodies, on account of their great distance, are incapable of operating. So much at least is certain, that every thing in the system of the universe has an immediate or remote connection with our globe; and this it is that renders the world a master-piece of the almighty architect. Its beauty consists in the harmonious variety of the parts of which it is composed, in the diversity, extent, and nature of their effects, and

in the sum total of the happiness resulting from all these combinations.

How is it then possible, O Christian, that you can make the influence of the moon and other celestial bodies an argument for cherishing superstitious notions? If you believe that an all-wise God has established the connection which subsists between all the spheres, you cannot possibly cherish ideas which so manifestly derogate from the divine wisdom. And if you are convinced that he governs all things with infinite wisdom and goodness, you cannot but resign yourself with joy to all the dispensations of his Providence.

## SEPTEMBER 12.

### OF THE IGNIS FATUUS.

THE meteor called Ignis Fatuus, Jack with the Lanthorn, or Will o' th' Wisp, has the appearance of a small unsteady flame, which dances about at the height of a few feet above the earth. Sometimes these flames appear to be suddenly extinguished, probably because bushes or trees intercept their light; but they soon make their appearance again in other places. They are rarely seen in cold countries; but are most frequent in winter in marshy situations. In Spain, Italy, and other countries they are more common in all seasons, and are not extinguished either by rain or wind.* They are

* M. Beccaria mentions two of these luminous appearances which were frequently observed in the neighborhood of Bologna, and which emitted a light equal to that of an

very often observed in places where vegetable and animal matters are undergoing putrefaction, such as burying grounds, dunghills, and bogs. Philosophers have as yet not been able to make a sufficient number of experiments on this kind of meteor, to ascertain its true nature; but we may form some plausible conjectures from the situations in which it is generated. As the ignes fatui are commonly observed in marshy places, they most probably consist of volatile vapors of the phosphoric kind. It is well known that putrescent vegetables and animals sometimes emit light; may not, then, ignes fatui be produced by vapors of this description, condensed by the nocturnal air? Perhaps

ordinary faggot. Their motions were unequal, sometimes rising, and sometimes sinking toward the earth, sometimes totally disappearing, though in general they continued hovering about six feet from the ground. They differed in size and figure; and indeed the form of each was fluctuating, sometimes floating like waves, and dropping sparks of fire. He was assured that there was not a dark night in the whole year in which they did not appear: nor was their appearance at all affected by the weather, cold or hot, snow or rain. They were observed to change their color from red to yellow, and generally grew fainter as any person approached, vanishing entirely if he came very near them, and appearing again at some distance.--Doctor Shaw also describes a singular *ignis fatuus* which he saw in Palestine. It was sometimes globular, or resembled the flame of a candle; and immediately afterwards would spread so much as to involve the whole company in a pale, inoffensive light, and then was observed to contract itself again, and suddenly disappear. In less than a minute it would become visible as before, and run along from one place to another; or would expand itself over more than three acres of the adjacent mountains. The atmosphere at this time he adds, was thick and hazy. T.

they may be the effects of weak electricity, produced by the internal motion of the vapors ascending into the atmosphere. Horses, dogs, cats, nay, even men may sometimes become so highly electric as to emit luminous sparks, by means of friction or motion.* May not the same be the case with respect to certain parts of the earth? It is not impossible that the earth, under certain circumstances, may be electrified; and in this case it cannot be astonishing if it should emit light. The air alone may generate ignes fatui, if it be rendered electric in some way or other.

Though the manner in which these meteors are produced is not ascertained, still it is indubitable that they must proceed from natural causes, and that there is consequently no necessity of recurring to superstitious causes. Superstition regards these luminous appearances with such awe and terror, that few beholders have the courage to approach them. The ignorant consider them as the souls of deceased persons, or even infernal spirits, that wander about for the purpose of leading the traveller astray. This superstitious notion may probably have originated in the remark that the ignes fatui, following the impulse of the air, always fly from

* Henckel, in his *Pyritologia*, relates, that one of his friends, who was of a sanguine temperament, had indulged himself in the exercise of dancing to such excess, and his perspiration was so profuse, that he imagined his life in danger. When he undressed, traces of phosphoric light were seen on his shirt, and in those places were left a number of reddish yellow spots, exactly resembling the concrete phosphoric acid. This luminous appearance, however, was not the result of electricity, but of the phosphoric matter which the sweat is known to contain. T.

those who pursue them, and pursue those who run away from them, and even settle upon carriages that move with great velocity. But this phenomenon proceeds from very natural causes; for as the person who pursues propels the air before him, and he who runs away occasions a strong current of air behind him, the result with respect to the ignes fatui is very easily accounted for.

How much care and uneasiness mankind give themselves about things which have no existence but in their own disordered imaginations! We might spare ourselves many terrors, were we to take the trouble to examine more closely the objects which excite our fears, and to investigate their natural causes. With what eagerness we pursue the goods of fortune, without ever enquiring whether they are worth the exertions we make to attain them, and whether they are capable of affording us that happiness which we so fondly expect. Most of those who are actuated by avarice and ambition are not more successful in the pursuit of honors and wealth, than the countryman who engaged in a fruitless chace for the purpose of catching the meteors of which we have just treated. What advantage do we ultimately derive from our incessant efforts to acquire goods, so nearly resembling ignis fatuus in their nature and duration! Terrestrial goods in general flee from those who pursue them, and fall to the lot of such as would appear to shun them.

## SEPTEMBER 13,

### OF THE MINERAL KINGDOM.

To construct wholesome and convenient habitations man requires a large store of various kinds of materials. If all these were dispersed over the surface of the earth, it would be quite covered with them, and no room would be left for animals and vegetables. All the metals, stones, and a hundred other substances which we are continually using, have accordingly been stored up in vast magazines under our feet, whence we can fetch them as we want them, without any very great trouble. To this end they are deposited near enough to the surface, beneath a vault of sufficient solidity to afford subsistence to man, and at the same time so soft that he can penetrate through it, and descend into the storehouse of Nature to supply his wants.

All the substances belonging to the mineral kingdom may be divided into four principal classes, each of which is distinguished from the others by essential characteristics. To the first class of minerals belong the earths. This denomination is given to those minerals which are not dissoluble in water or oils, which are not malleable under the hammer, and which preserve their constitution in a strong heat. To this class belong not only the simple earths, but also the stones which are compounded from those earths. The stones are divided into the precious and the common. The latter are the most numerous, and exhibit masses of every figure, color, magnitude, and solidity, according to the constituent parts. There is also a very great diversity of precious stones. Some are perfectly

transparent, and these appear to be the most simple; others are more or less opaque, according as particles of which they are composed are more or less heterogeneous.

Salts form the second class of minerals. It contains those substances which are soluble in water, and which leave a taste upon the tongue, that is called acid; and alkalies, known by their alkaline taste, and the green color which they impart to vegetable blues. A combination of these two produces the neutral salts. To the latter belongs, in particular, the common or culinary salt, which is either extracted from the earth, or prepared by evaporation from the water of the ocean or of springs. These salts are one of the principal causes of the growth of plants. They are probably the cause of the consistency of vegetables, as well as of all compound bodies, and occasion the fermentations whose effects are so manifold and so extensive.

The third class of the mineral kingdom comprehends the inflammable or combustible bodies, to which has been given the general appellation of bitumens. They burn in the fire, and when they they are pure, dissolve into oils, but never into water. These combustible bodies differ from other minerals in this respect, that they contain a greater quantity of inflammable matter. It is this that renders those bodies in which it is found in sufficient quantity combustible; but there is more or less of it in almost all substances.

The fourth class of minerals comprizes the metals. These are bodies which considerably exceed all other minerals in specific gravity; they are fusible in fire, and afterwards recover their former solidity. They are particularly brilliant, and some

of them are malleable. Among the metals there are some which melt in fire without loss of weight or alteration, and which are therefore denominated noble or perfect metals. Of these there are two kinds, gold and silver. Other metals, on the contrary, which are called base or imperfect, are destroyed in a longer or shorter time by fire, and converted into oxides. One of these, lead, possesses the property of transforming itself and all the other metals, except the noble ones, into glass. The imperfect metals are five in number; mercury, lead, copper, iron, and tin. There are, besides, other bodies, which are commonly distinguished from the preceding because they are not malleable, and are called semi-metals. They are seven in number: platina, bismuth, nickel, arsenic, antimony, zinc, and cobalt.*

* The sum total of the metals enumerated above by the author is only fourteen; subsequent discoveries have increased the number that we are now able to reckon up, to twenty-eight. The ancient division of metals into noble, base, and semi-metals has been discarded, and new arrangements have been adopted in their stead. The most recent and the best contrived classification of metals is that given by Dr. Thomson, in his Chemistry. He divides the metals into four classes. The first comprehends the *malleable* metals, which are fourteen in number, viz: gold, platina, silver, mercury, palladium, rhodium, iridium, copper, iron, nickel, tin, lead, zinc. The second class includes the *brittle and easily fused*; bismuth, antimony, tellurium, and arsenic. The third comprehends metals that are *brittle and difficultly fused*. These are, cobalt, manganese, chrome, molybdena, uranium, and tungsten. Those belonging to the fourth class are termed *refractory* metals, because they have never yet been exhibited in a separate form, but always in combination with oxygen. These are titanium, columbium, tantalium, and cerium. T.

Of the mineral kingdom.

The whole mineral kingdom is the workshop of Nature, where she labors in secret for the benefit of the world. No naturalist has yet been so fortunate as to detect her in her private operations, and to learn of her the art with which she combines and prepares the earths, the salts, the inflammable fossils, and the minerals. As difficult as it is to discover the purposes to which Nature applies the matters which are daily produced, so difficult it is to detect the means by which the particles are incorporated, and reduced to that form in which the mineral kingdom presents them. We know very little of the surface of the earth, and still less concerning its interior. The deepest mines are not more than six hundred and thirty fathoms from the surface, and this is not the six thousandth part of the earth's diameter. This reflection alone is sufficient to convince us how impossible it is to acquire an accurate and comprehensive knowledge of the nature and formation of the different productions of the mineral kingdom. In the use which we make of the gifts of Nature, it is of little consequence whether we are acquainted with their origin and constituent principles or not: we ought to be satisfied with knowing how to apply them to the most beneficial purposes. We know enough to glorify the Creator, since we are convinced that there is not a particle, either on the surface of the earth or in its bosom, in which God has not manifested his power, his wisdom, and his goodness.

## SEPTEMBER 14.

### OF SOME REMARKABLE EXOTIC VEGETABLE PRODUCTIONS.

INDEED, my brethren, we do not pay sufficient attention to the blessings of God, especially those which are wafted to us by the ocean from distant countries, and are almost indispensably necessary for our subsistence. Did we reflect how many wheels in the great machine of Nature must be set in motion, how much labor and industry must be expended, before we can obtain a loaf of sugar or a stick of cinnamon, we should not snatch the gifts of Nature as our prey, but receive them with the sincerest gratitude to that Being who conveys them to us through so many channels. We shall now notice some of the principal foreign vegetable productions which have become articles of the first necessity in our domestic economy. This consideration may perhaps produce some useful reflections in our minds; at least it will give us occasion to commiserate the lot of our miserable fellow-creatures condemned to slavery in order to furnish us with so many delicacies.

Sugar is properly the salt expressed from the juice and pith of the sugar-cane, a reed principally cultivated in the continent of South America and the West India islands; and which likewise grows in great quantity in the East Indies and the African islands. The preparation of sugar does not require much art, but it is a laborious operation, which is chiefly performed by the hands of slaves. When the canes are ripe they are cut down, and the juice is expressed from them in a mill constructed for

the purpose. The juice is immediately boiled, otherwise it would ferment and turn sour. When it boils the scum is taken off, and this boiling is repeated four times in different vessels. It is then poured into moulds, where it acquires the necessary consistence, to which the lime mixed with it while boiling principally contributes.

Tea is prepared from the leaves of a shrub which grows in Japan, China, and other regions of Asia. These leaves are gathered twice or thrice in spring. Those of the first gathering are the finest and most delicate, and are known by the name of imperial tea, none of which, however, is exported to Europe. What the Dutch sell under that name is only tea of the second gathering.

Coffee is the kernel of a fruit resembling the cherry. The tree which bears it is a native of Arabia Felix, but has been transplanted into many hot countries. The best coffee, next to that of Arabia, is raised in the island of Martinique. The fruit is formed like a cherry, and in the middle of it is the kernel, which we call the bean. When fresh this kernel is yellowish, or of a light green, and it preserves nearly the same color when dry. The fruit is dried upon mats in the sun, and afterwards bruised with rollers to make the kernel drop out. Each kernel divides into two halves, and, after being dried a second time in the sun, they are shipped.

Cloves are the dried flower-buds of a tree which formerly grew wild on the Molucca islands, but which the Dutch have since transplanted to Amboyna. This tree resembles the laurel in figure, and its trunk is covered with bark, like that of the olive-tree. At the extremities of the branches grow

clusters of white flowers, in the form of a nail. The fruit is at first light green; it afterwards turns yellow, then red, and lastly dark brown, such as we see it.

Cinnamon is the bark of a species of laurel which grows scarcely any where but in the island of Ceylon. The trunk of the tree which produces it is thick, divides into several branches, and is covered externally with a greyish red bark, but the interior bark is reddish. The leaves would very nearly resemble those of the laurel, if they were shorter and less pointed. The flowers are small and white, and have an agreeable smell, almost like that of the lily of the valley. When the tree has attained a certain age, the bark is stripped off: the outer bark, being good for nothing, is thrown away, but the inner is dried in the sun, which causes it to roll up in the form in which it is brought to Europe.

Nutmegs and mace are the produce of one and the same tree, which grows in all the Moluccas islands. The nut is covered with three skins or coats. The first drops off when the nut is ripe; the second, which is very fine and delicate, then appears; it is carefully separated from the fresh nut, and exposed in the sun to dry. This is what we call mace. The third rind immediately covers the nutmeg, which is taken out of it, and steeped for some days in lime-water. This done, it may be exported without danger of spoiling by the way.

Cotton grows in most parts of Asia, Africa, and America. It is inclosed in the fruit of a shrub. This fruit is a kind of pod, which opens when ripe, and exposes a flock of down as white as snow, which expands with the warmth, and grows to the size of an apple. The cotton is separated from the seed by

means of machines made for the purpose, and is thus prepared for the manufacturer.

Oil is the juice expressed from the olive, which is produced in great abundance in France, Spain, Portugal, and Italy, which contain whole woods of olive-trees. The inhabitants of the provinces where the olive-tree grows make use of its oil instead of butter, because the excessive heat burns up the grass to such a degree as to prevent them from keeping cattle.

Pepper is the fruit of a shrub which requires a prop to support it. Its branches are knotty, like the vine, which it exactly resembles. Its leaves, which have a strong smell, are oval, and terminate in a point. The flowers which grow in the middle and at the extremity of the branches are white, and produce small bunches, like currants, each of which contains twenty or thirty pepper-corns.

To the reflecting mind it affords no small delight to contemplate the abundant provision made, not only for the supply of our wants, but also to contribute to our pleasures. Consider, reader, the profusion of blessings which you receive at the hand of God. Observe how every country pays its tribute, in order to gratify your utmost wishes. And alas! unfortunate wretches who deserve quite as well as you to eat their bread in happiness and ease, cultivate and prepare these delicacies, which you enjoy in such abundance. If you will not think of your almighty benefactor, bestow a thought, at least, on the instruments which he employs to furnish you a portion of your subsistence. But how is it possible that you can forget that God, who has every where spread a table for you, and has erect-

ed monuments of his beneficence in every region of the globe!

## SEPTEMBER 15.

### REFLECTIONS ON MYSELF.

I LIVE; my blood circulates unfelt through my veins, formed and protected with so much art. I sleep; and, unconscious of my existence, my soul still continues to inform the outstretched and apparently inanimate body. I awake; my senses resume their functions. and the soul receives more vivid impressions. I eat, I drink: charmed with the exterior beauties of Nature, with which I float in the ocean of omnipotence, my heart is filled with transport.—Am I the author of all these effects? Did I impart to the first principles and the first lineaments of my body this astonishing faculty of motion, when involved in the night of non-existence, I knew not what motion was? Did I form the assemblage of the different parts that compose my frame—I, who am not even acquainted with their structure and combination? Did I possess superior intelligence before I began to exist, or did I exist before the intelligence with which I am endued? How is it that I cannot determine the point of time between sleeping and waking? What is the mechanism of my stomach, which digests aliments without my command or assistance, and how is this digestion effected? How happens it that all the creatures of my species are formed like myself, and why did I not give myself a different structure? Did I create all the beauties of Nature, or did they

produce themselves? Who rendered me susceptible of pleasure and pain? Who causes the corn to grow, and the spring to burst from the earth, that my body may not perish, or my limbs refuse their office? Who makes the rays of light to enter my eyes, that I may not be enveloped in perpetual darkness? Who confers on me the blessings which I enjoy, and whence arise the evils that so sensibly affect me? Why do I not revel in continual prosperity; and why have I been so cruel as to form myself with so many imperfections? Do all these things proceed from my volition? Have I the power to produce them, and are others of my fellow-creatures whom I see, whom I have seen, and shall perhaps again behold, endued with similar faculties?

Absurd and contradictory thoughts, which evince the perverseness of him who can conceive them! My soul, with its imperfections and circumscribed intelligence, attests the greatness of my Creator, a necessary and infinitely perfect being, on whom I am completely dependent. This body, with whose structure I am myself unacquainted, proves the existence of a workman, whose greatness my feeble intelligence cannot embrace, who has fashioned with exquisite skill these muscles, these nerves, these veins, and in a word, every part of my body. How could feeble man, who is incapable of creating a single hair, have conceived the design of such an astonishing machine, with so many different parts, adapted with the utmost harmony to the performance of their respective functions, when he cannot even make an exact copy or representation of it? There is no part of our body, however small, but what has been formed for some wise

purpose; it is either indispensable, or at least a necessary consequence of others. Experience and reflection leave no doubt on this subject. And truly the Creator must be infinitely great, since I am not the only one that can say he has formed me with inimitable art and inexpressible wisdom. Millions of my fellow-creatures, innumerable beings, animate and inanimate, seem to exclaim with one voice: "Behold the invisible God, admire him in thyself and in us. Contemplate the meanest of us, which has received from him life and existence as well as thou; and thank him who has formed us all in such a wonderful manner!"

Yes, O my God, thou author of my being, to thee I owe a debt of gratitude which I shall never be able to discharge. Through thee I live, and move, and have my being; to thee I owe the blessings of a sound mind and a healthy body; to thee alone am I indebted for all the pleasures which the works of creation afford me. Thou waterest the earth that it may not be transformed into brass, and that I may not perish for want of subsistence. It is thou, whose omnipotence, whose greatness, and whose wisdom I adore, in common with all intelligent beings; whose providence I praise, and to whose future protection I most humbly commend myself. Thou knowest our hearts, thine eye is upon us, and thou observest all our actions. It is not thy wish that we should languish in darkness and despondency, and consider existence as a misfortune; thou permittest us to enjoy with a grateful heart the innocent pleasures of life. When the bird that wings the air excites my astonishment by the rapidity of his flight, the elegance of his structure, and the melody of his song, he shall remind

me of the gratitude I owe thee, since thy word informs me that his strains are a hymn of praise to thee. Thou providest for his subsistence as well as mine. He feeds upon the grains and seeds which thou causest to spring up for him, in like manner as the corn which seems to decay in the earth, becomes by thy order the support of my life. Thou givest me rain and sunshine, making the earth bring forth the most delicious fruits, though all my efforts would never be able to produce a single blade of grass. Thy bounty extends still farther. Thou not only suppliest us with the most necessary articles of subsistence; thou also bestowest on us what the world denominates happiness, riches, and pleasure. Thou directest events in such a manner that even those which appear the most untoward, nevertheless tend to promote our welfare. In a word, wonderfully hast thou formed us, and by a continual series of miracles dost thou preserve us.

Grant that I may employ the irrevocable hours of my short pilgrimage in a manner consistent with the end of my existence, that when I shall quit this world, I may be removed into a state of more perfect felicity, and be enabled to contemplate with clearer vision the mysteries of grace. May the spectacle of thy marvellous works excite me, through the power of thy divine spirit, to praise thee, the almighty Creator and Redeemer, from eternity to eternity!

## *SEPTEMBER 16.*

### COMPARISON BETWEEN THE STRENGTH OF MAN AND THAT OF ANIMALS.

THOUGH the human body is externally more delicate than that of animals, it is very nervous, and perhaps stronger in proportion to its size than the body of the strongest. When we compare the strength of the lion with that of man, we must not forget that the use which this animal makes of his claws frequently gives us a false idea of his strength, and we often place to the account of the latter what ought to be ascribed to his weapons alone. A better way of estimating the comparative strength of animals and man, is by the weight which they are able to carry. If it were possible to unite in a single point or effort, the sum total of the strength that a man exerts in a day, it would be found that a person of middling stature could lift every day, without injuring himself, a weight equal to one million seven hundred and twenty-eight thousand pounds, to the height of a foot from the ground. Men accustomed to hard labor can, without much exertion, lift with their hands weights of one hundred and fifty, and sometimes of two hundred pounds; and porters often carry burdens of six or seven hundred weight. In London, those who work on the quays at loading and unloading vessels, sometimes carry weights that would kill a horse. The bulk of a man's body is in proportion to that of a horse as one to six or seven; so that if that animal were as strong in proportion as a man, he would be able to carry twelve or fourteen thousand pounds weight. No horse can carry such a burden; and making al-

dowance for the difference of size, his strength is inferior, or barely equal to that of man. A certain Frenchman made an experiment for the purpose of ascertaining the strength of the human body. He contrived a kind of harness, by means of which he distributed over every part of the body of a man standing upright, a number of weights, in such a manner that each part of the body supported as much as it could bear in proportion to the rest. With this contrivance a man could support, without being overburdened, a weight of two thousand pounds.

We may likewise form some judgment of a man's strength from the continuance of his efforts and the agility of his motions. Men have been known to outstrip horses in running, or at least to continue the exercise for a longer time. At Ispahan, in Persia, the couriers by profession will go almost one hundred miles in ten or eleven hours. Travellers assure us that the Hottentots will overtake lions in the chace, and that the American savages pursue the elk, which is as nimble as a stag, with such swiftness, as to tire and seize that animal. A thousand astonishing things are told of the fleetness of the Indians, and of the long journies which they perform on foot over the most tremendous precipices, the most rugged mountains, and through trackless regions. They are said to travel four or five thousand miles in six weeks, or at most, two months. What other animals, except birds, have muscles strong enough to bear such long-continued fatigue? Man, in a state of civilization, knows not his own strength, how much it is decreased by indolence, and how much it may be augmented by the habit of violent exercise. We have nevertheless

had instances among us of men who possessed extraordinary strength. But this gift of Nature, which would be of great value if we had occasion to employ it, like the savages, in our personal defence, or to procure subsistence, is of much less advantage in civilized society, where the powers of the mind are more serviceable than those of the body, and where those occupations which require strength are followed only by people of the lowest class.

We have here a new demonstration of the ineffable wisdom with which God has constructed our bodies, and has rendered them capable of extraordinary activity. In this view we cannot reflect without disgust on the lives of those who spend their days in idleness and effeminacy, and who are afraid lest every exertion of their strength should endanger their health and shorten their days. For what purpose hath God endued us with bodily strength and so many faculties, unless to make use of them? We therefore transgress his decrees, and are guilty of inexcusable ingratitude, if we consume our strength in effeminate inactivity. Let us then employ our bodily powers for the good of our fellow-creatures, according to the station in which God hath placed us; and, if circumstances require it, let us even earn our bread by hard labor and the sweat of our brow. Are we not, even then, more fortunate than many thousands of our fellow-creatures, who groan beneath the yoke of a cruel, and almost insupportable slavery, who are compelled to labor beyond their strength, and, when worn out with fatigue, have no means of procuring ease and refreshment for their enfeebled bodies? The more happy is my lot, the more cheerfully will I fulfil my avocations; and the success of my

exertions shall excite me to look up to that God, who hath conferred on me the strength for which I have occasion, and who hath graciously preserved it unimpaired to the present moment.

## *SEPTEMBER 17.*

### INSTINCT OF THE BUTTERFLY IN THE PROPAGATION OF ITS SPECIES.

AT this season the butterflies are swept all at once from the empire of the creation; but the species is not become extinct. These insects still live in their progeny, and by means of a wonderful instinct they have provided for the perpetuation of their species. From the eggs which they lay new generations will proceed; but where can they deposit them to be secure from the rains of autumn, and the intense cold of the approaching winter? Are not these eggs in danger of being destroyed either by the one or by the other?

That Being who hath endued man with wisdom, hath instructed even this irrational butterfly how to secure the only legacy it can bequeath to the world, by covering its eggs with a viscous matter secreted from its own body. This species of glue is so tenacious, that ordinary rain cannot penetrate it, and that the usual cold of winter cannot destroy the future progeny contained in the eggs. It is worthy of notice, that though each species invariably pursues the same method from generation to generation, yet the different branches of the family of butterflies adopt different measures for the preservation of their posterity. Naturalists inform us that some lay their eggs at the commencement of

Instinct of propagation in the butterfly.

autumn, and die soon afterwards, extended over their beloved progeny. The rays of the sun have still sufficient power to warm the eggs; these produce a number of little caterpillars, which immediately begin spinning, and make themselves nests and convenient habitations, where they pass the inclement season, without eating, and perhaps even without motion. If we open the retreat of one of these insects, we shall find that what it has spun serves it for a tent, curtains, and bed. It is likewise worthy of remark, that the butterfly, like other insects, always lays its eggs on that kind of plant which is peculiarly adapted to the support of its young, and which they choose for their subsistence when they begin to eat; that they may be surrounded with the nourishment most proper for them, and neither perish of hunger, at a time when they can scarcely crawl, nor be obliged to take long journies till they have acquired sufficient strength to perform them.

These, and many other things of the same kind, ought to fill us with admiration of the wise arrangements of an all-preserving Providence. If we did not require miracles, and things out of the usual course of Nature to engage our attention and to excite our interest; the consideration of the solicitude with which these insects provide for their posterity, and which is manifested, in like manner, by each succeeding generation, would not fail to fill us with the utmost astonishment. Let us, who are rational creatures, learn from these insects to cherish in our hearts a love for our offspring, and to interest ourselves in behalf of those who are to succeed us on the stage of life. In the formation of useful plans, let us not be discouraged because it is

possible we may not live to see them completed. We ought to consider that we are in some respects servants of the public, and that we should at least study the interests of posterity as much as our ancestors consulted our welfare. But, above all, it is the duty of parents, after the example of the female butterfly, to provide for their progeny, that at their death they may leave them in a situation as comfortable and as advantageous as possible. It is, indeed, out of our power to foresee, and consequently to prevent the distress in which they may be involved by fortuitous circumstances, but let us not expose them by our fault to indigence and affliction. O that all parents would therefore study with due solicitude the future welfare of their offspring! O that none would be so imprudent as to leave their temporal concerns in confusion, but that all parents would so put their houses in order, that, after their death, their children may not run the risk of being oppressed, or even stripped by unfeeling and rapacious strangers.

## SEPTEMBER 18.

### THE VINE.

THE existence of the vine alone is sufficient to convince us of the folly and absurdity of the complaints which people sometimes make of the inequalities of the earth. In flat countries the produce of the vine is never of very good quality; neither are all hills adapted to its growth, but only such as have a southern or eastern aspect. The hills may be regarded as the walls of Nature, where she invites us to fix espaliers, their situation affording the

advantage of a more powerful heat, augmented by the reflection, together with the benefit of a free, unobstructed air. The driest soil, the steepest hills, inaccessible to the plough, are transformed into spots equally profitable and agreeable, are annually covered with the most beautiful verdure, and produce the most delicious fruit. As the soil that supports the vine appears dry or desolate, so the appearance of the plant itself has not much to recommend it. Who, that did not know it from experience, would suppose that a vegetable so mean, so weak, so unseemly, and so unfit for any other useful purpose, yielded such an excellent beverage! And yet the power which resides in the vine is such, that the sap is propelled upward with from five to eight times the force of the blood in animals. Its evaporation is so considerable, that, to supply the fluid which exhales through the leaves, one hundred and fifty-two inches of sap are required to ascend in twelve hours. Who hath endued the vine with properties so superior to the meanness of its origin, and the qualities of its native soil? Who infused into it such spirit and such fire, and rendered it capable, not only of living many years, but of receiving in that time fresh accessions of strength?

With what wisdom hath God distributed the vine over the face of the earth! Is not his wise government manifested in this circumstance, that the vine will not thrive in every country, and that it cannot be cultivated with success except between the fortieth and fiftieth degrees of latitude, and consequently about the middle of either hemisphere. The vine was originally a native of Asia, whence its cultivation gradually extended to Europe. The

Phenicians, who, at an early period, visited all the coasts of the Mediterranean, carried it with them to the continent, and most of the islands. It flourished in the islands of the Archipelago, and was successively introduced into Greece and Italy. There it multiplied to such a degree as to instigate the Gauls, who had tasted the liquor, to cross the Alps, and to establish themselves on either bank of the Po.* The cultivation of the vine gradually became general throughout France, and at length it flourished also on the banks of the Rhine, the Moselle, the Neckar, and in other provinces of Germany.

These remarks, my dear reader, may furnish occasion for some important reflections. As the driest soil is best adapted to the cultivation of the vine, so the most barren regions are sometimes the most favorable to the study of philosophy and the sciences. In provinces universally despised for their poverty, have arisen men, the rays of whose genius have illumined distant countries. No region is so dreary, no town so small, no village so miserable as entirely to preclude the successful cultivation of science. Nothing is wanting, in general, but the

* This fact is a striking proof on what trivial circumstances the revolutions of empires sometimes depend. M. Valmont de Bomare, from whose useful work the author has borrowed his brief history of the vine, observes, that, "since the multiplication of this plant in every country, the inhabitants, content with their condition, have not endeavored to acquire new settlements elsewhere. It is only since the multiplication of vineyards that the nations of Europe have ceased to emigrate."—An important observation for the philosopher and historian. T.

necessary resources and encouragement. What inestimable benefits might we confer, were we only to give ourselves the trouble to forward, as much as lies in our power, the cultivation of the human heart. Ye sovereigns, ministers of religion, and instructors of youth, how powerfully ye might contribute to the benefit of your contemporaries and the happiness of posterity, if, by means of rewards, encouragement, and useful establishments, you endeavored to revive religion, science, and all the social virtues in declining countries, drooping cities, and wretched villages. Such exertions could not be wholly unavailing. They repay us, or at least our descendants, with a rich harvest, and place us in the rank of those who, in the character of benefactors of mankind, have secured the approbation of the Almighty, and the everlasting respect of their fellow-creatures.

The vine, with its dry and unsightly branches, is an emblem of those persons, who, though destitute of the exterior honor of birth, or the splendor of rank, take delight in doing good. How often does it happen that men who live in obscurity, and whose appearance bespeaks nothing uncommon, nevertheless perform actions which exalt them above all the monarchs of the earth! And here, my dear reader, I may direct your attention to Jesus Christ himself. To judge from the abject state in which he appeared, we should not have expected of him those great and wonderful works which have made him the Saviour of mankind. Jesus, like a dry branch planted in steril land, produced fruit which cheered and blessed the whole world; and he has shewn, by his example, that we may live in po-

verty, misery, and contempt, and yet be able to promote the glory of God, and the welfare of our fellow-creatures.

## SEPTEMBER 19.

### HYMN ON THE WORKS OF THE CREATION AND OF PROVIDENCE.

PRAISE ye our God! Let all the people celebrate his name with shouts of gladness. Praise with a mighty sound his power and his beneficence! Adore him, prostrate yourselves before him. Sing, extol, and give glory to the king of nations!

'Tis he whose power formed the elements, the firmament, and the light, from nothing: who separated the earth from the waters by which it was surrounded. It was his hand that made the sea, and the innumerable hosts of creatures which are supported by his bounty.

'Tis he who gave heat and resplendence to the sun, who determined the various changes of the moon, who taught the stars the path they are to pursue; 'tis he who kindles the lightnings, and who speaks in thunder.

'Tis he who maketh himself heard in the roaring of the tempest. The strength of the lion and the structure of the insect are alike monuments of his power; and to give delight to man he teacheth the nightingale to form her melodious strains.

He impregnates the flowers with the balmy perfumes which I inhale; he weighs and agitates the air; he commands and rules the winds. The sea which roars at his mighty word, obeys him, and

is silent when he directs it to be still. God reigns in the abysses of the deep.

Almighty Being, how strikingly is thy magnificence displayed in thy creatures! How marvellous are the traces of thy power! Every object in the creation proclaims thy omnipotence, and cries: "Contemplate me, and give glory to my author!"

Accept, O my Creator, the tribute of my unfeigned gratitude and adoration. Come all ye beings whom he hath made, and join with me to celebrate our general Creator. Let us prostrate ourselves at his feet and adore him. The God who created the universe is worthy of our homage.

## *SEPTEMBER* 20.

### OF THE DAILY WONDERS OF GOD.

THE universe, which still exists in all its pristine beauty and order, is a miracle ever present to our view. What a spectacle! How astonishing the number, the magnitude, the variety, and beauty of the works of creation! What but the hand of the Most High could have placed in yon boundless expanse the sun and stars, whose prodigious size and distance overwhelm us with amaze? Who prescribed to them the orbits in which they have revolved for so many thousands of years? Who meted with such accuracy the respective powers of those orbs, and established such a perfect equilibrium between them and the ether in which they are suspended? Who has placed the earth at such a just distance from the sun, as to be neither too far from that luminary, nor too near to him. The alterna-

tion of day and night, the revolution of the seasons, the innumerable multitude of animals and reptiles, of plants, vegetables, and all the various productions of the earth, are the works of divine omnipotence. If such a world were to start into existence before our eyes, with what sentiments of awe and admiration should we hail the miracle!

The particular providence of God is a continual proof of his majesty, his power, his wisdom, and his omnipresence. The marked protection of the divine hand, instances of which almost every person has met with; the different means which he employs to lead men into the paths he wishes them to pursue; the calamities by which he awakens and brings them to a sense of their situation; the extraordinary changes which he permits for the benefit of his kingdom, and which are generally effected by mean instruments, and under circumstances that would appear to render their exertions unavailing; the great revolutions which he operates to spread his word and the knowledge of himself from one region of the globe to another; all these are effects in which we ought to acknowledge the ever-active hand of God, and which, did we pay due attention to it, would cause us to exclaim: "This is the Lord's doing, and it is marvellous in our eyes!"

Let the wonderful spectacle which is every where presented to our view awaken our attention and reflection, and we shall find in every object that God who is continually operating upon us by the ordinary means of his grace, and suffers his word to dwell richly among us. Surely those on whom no impression is made by those effects which they see and hear, would not be converted even if new mi-

racles were to burst upon their view. Ought not man, who sees that God has created this glorious universe, teeming with so many wonders, that he is indebted to him for all the blessings he enjoys, ought he not, I say, to believe in, and to love that beneficent Being? And yet he refuses this homage and obedience. What then is there that he would not resist!

Ye who daily witness the wonders of your God, pay attention to them, and harden not your hearts against the truth. Suffer not your prejudices and passions to prevent you from reflecting on the admirable works of the Lord. Contemplate the visible world; survey yourselves, and you will find abundant cause to acknowledge him, who daily performs such miracles before your eyes. Struck with astonishment, you will then exclaim: "Praise, honor, and glory be to the Most High, the author of all good, and the redeemer of our souls, who doth all these wonders; to God, who filleth our hearts with consolation, who soothes our afflictions, who wipes the tears from our eyes, to him be glory for evermore!"

## *SEPTEMBER* 21.

### OF THE PREPONDERANCE OF GOOD OVER EVIL IN THE WORLD.

In all the adversities we may experience through life, we shall derive great consolation from the adoption of this principle, that there is much more of good than of evil in the world. Let us seek the most wretched of mortals, and ask, whether he can enumerate as many causes of complaint as he

has motives for gratitude. And if the number of his misfortunes were greater than it actually is, still it would be far surpassed by the multitude of the blessings he has received.

To convince yourselves of this truth, calculate the long periods of uninterrupted health, and the few days in which you have been afflicted with illness; oppose to the small number of calamities and troubles you have experienced in civil and domestic life, the numerous pleasures that you have enjoyed; compare all the good and virtuous actions by which almost every man confers benefit upon others, with the small number of those that are prejudicial to society; enumerate, if you can, the delights which pervade all the senses of every human being, the pleasures attached to every age and condition; reckon up the comforts derived from the numerous gifts which Nature has every where so profusely bestowed, and the conveniencies which human industry is capable of procuring with them; count the pleasures of growing experience, of beneficence, of gratitude; recapitulate the joys you have felt on avoiding or surmounting some danger or difficulty, on gaining some victory over yourself, or performing some commendable action; recount all the good things that you can recollect having enjoyed, and you will find that they form but a very small portion of those which have fallen to your lot. Know then, that it is the preponderance of the good that causes evils so deeply to affect us. Consider how easily we forget the good we have experienced in time past, because it has been succeeded by other blessings or pleasures, and that evils are impressed more deeply on our memory, because they are of less frequent occurrence.

Of the preponderance of good over evil.

Reckon up all the fortunate circumstances which you can recollect, but which form only a small part of the sum total of the happiness you have enjoyed. Oppose to these the evils which are imprinted on your memory, and the utility of which you cannot discover. Observe that I say, not all the evils you remember; neither such as you must yourself acknowledge to be the means of affording superior pleasures, and of giving a zest to the good; nor those which men are obliged to endure, as preservatives against greater evils, in order to render them wiser or more happy, or to serve as a warning to others; for these evils are abundantly compensated by their salutary consequences to all mankind. In this calculation, oppose to the pleasures, the enjoyment of which you recollect, only those evils, the utility of which you cannot perceive. Make this estimate in the moments of composure and serenity, and not when oppressed with fear, anxiety, despondency, or ill health. You will then be thoroughly convinced that the good we experience in this mortal state overbalances the evils by which we are afflicted.

But why does man, endued as he is with the faculty of reason, pay so little attention to the continual proofs of the tender care of divine Providence? Why is he so prone to dwell on the dark side of things, and to torment himself with gloomy ideas? Doth not the goodness of God present only agreeable objects to our view? Why then should we be constantly brooding over our infirmities, and the calamities to which we are liable? Why do we magnify them in imagination, and perversely turn our eyes from all that is capable of cheering and soothing our hearts? Such, however, is our

disposition. We fix our whole attention on circumstances which excite painful sensations, and meanwhile a torrent of happiness rolls past us unnoticed. We often bring upon ourselves distress and vexation, from which we might have remained exempt, had we been more attentive to the blessings of the Almighty. Let us, my brethren, for the sake of our own peace, renounce this absurd mode of proceeding. Let us, with full conviction of heart, believe that God hath impartially distributed his benefits over the whole earth; then, instead of mourning and complaining, we shall each have abundant reason to break forth into songs of praise and gratitude.

Blessed be God, my highest good! who richly bestoweth on me every blessing. If he sometimes suffers me to be tried with affliction, he soon pours the balm of consolation into my heart, restores tranquillity to my soul, and his goodness cheers me with the promise of everlasting felicity. He leads us by secret paths to the happiness he hath reserved for us. The salutary purposes of those trials which he sends shall one day be exposed to our view; and meanwhile his paternal hand is daily employed, though unseen by us, in protecting us from much greater evils.

## *SEPTEMBER 22.*

### OF THE HOSTILITIES OF ANIMALS.

THE animals live in a state of incessant warfare, one species continually attacking and persecuting another. Each of the elements is a field of battle for them; the eagle pounces upon the inhabitants

of the air; the tiger preys upon those of the earth; the pike gorges the tenants of the waters; and the mole pursues the business of blood under ground. In these and many other species of animals, that instinct which impels them to provide for their subsistence is the cause of their destroying each other. Many animals, however, manifest an antipathy which cannot be accounted for on this principle. It is evident that those animals which entwine the trunk of the elephant, and press it together till they have suffocated him, do not act thus for the purpose of procuring nourishment. If the ermine creeps into the ears of the bear and the elk while they are asleep, and bites them most cruelly with his sharp teeth, it cannot be said that it commits this act of hostility to satisfy the calls of hunger. In short, we shall find that there is scarcely any animal, however small, that does not serve for food to others.

I am aware that many regard this arrangement of Nature as cruel and inconsistent; but I can confidently assert that this antipathy and this enmity among animals is a most salutary ordination for the world. It is highly useful that animals should destroy each other. On the one hand, many species are produced which could not otherwise exist; and on the other, these numerous species are not detrimental, but beneficial to the rest. Insects and many kinds of reptiles feed upon the carcases of animals; others attach themselves to the bodies of living creatures, and subsist upon their flesh and blood. The insects again serve for food to other classes. The beasts and birds of prey kill other animals, because the flesh of the latter is designed for their food. If the number of the animals were

not thinned, they would soon become burdensome to the earth. If there were no sparrows to devour the insects, what would become of our flowers and fruits? Were it not for the ichneumon, which is said to seek and destroy the eggs of the crocodile, this formidable animal would increase to an alarming degree.

How great a portion of the earth would be desert, and how many species would never have received existence, if there were no carnivorous animals! Or will it be said, that all these animals might have subsisted on vegetables? In this case our fields would not have afforded sufficient nourishment for the sparrows and the swallows alone. To this end also their structure must have been totally different from what it is. And what should the fishes live upon, if they were not to consume the inhabitants of the waters? In my opinion the animals would lose much of their activity and ingenuity were they not actuated by a spirit of hostility and persecution. The creation would be less animated, the animals would appear to be overtaken by a kind of lethargy, and man himself would display much less activity. Of how many striking proofs of the infinite wisdom of our Creator should we be deprived, if a general peace prevailed among animals! For the skill, cunning, and address manifested by animals in the ensnaring or pursuit of their prey, are evident demonstrations of the greatness of our Creator.

Yes, my brethren, this circumstance, so far from obscuring the wisdom and goodness of Providence, rather tends to shed additional brilliancy around them. It forms a part of the great system of Nature that one animal should destroy another, and we might have had some occasion to complain of

this arrangement if it had led to the extinction of any species. Now this never happens; but the continual warfare among them is attended with the advantage of preserving a proper balance. In this point of view, carnivorous animals are indispensable links in the chain of Nature; and for this reason their number, compared with that of the useful ones, is very small. On this account also the strongest and most ferocious animals possess, in general, the least sagacity. They either destroy each other, or their young serve as food for other beasts. Hence also Nature has granted to the weaker species a thousand arts and means of defence. All of them possess as much acuteness of sense, strength, agility, foresight, and cunning as is requisite to counterbalance the strength, swiftness, and craft of their enemies. Can any one behold this arrangement without clearly discovering in it the adorable wisdom of God? We should probably acknowledge with astonishment that this warfare is a real good, if we could embrace all the relations which subsist between the different species of animated Nature. This knowledge is perhaps reserved for eternity, when we shall obtain an insight into numberless other subjects which are here veiled in obscurity.

We may, therefore, form some conception why the mutual hostilities of animals should be necessary; but it is more difficult to comprehend why such inveterate animosity and such destructive wars should prevail among the nobler species of God's creatures, among men. To the disgrace of humanity and of the Christian religion, we are, alas! compelled to acknowledge that there are ferocious animals among men; with this difference, that their

modes of attack are more diversified and more secret than those of brutes. Nothing can be more contrary to the object for which man was designed. God intended that every man should render himself useful to his fellow-creatures, and contribute by every means in his power to their comfort and happiness; that each should be to the other a protector, a guardian, and a benefactor. Let us not counteract this gracious design of the Creator, but endeavor to live in peace and harmony. Let the animals persecute, hate, and destroy each other; but let us, after the example of Jesus Christ, cherish in our hearts the love of our fellow-creatures, and cheerfully embrace every opportunity of promoting their welfare and happiness.

## *SEPTEMBER* 23.

### MORAL USES OF NIGHT.

THE days grow shorter, and the nights lengthen in the same proportion. With this arrangement of Nature many people are dissatisfied. Some may perhaps secretly wish that there were either no nights at all, or that, through the whole year, they were never longer than in the months of June and July. Such wishes, however, betray our ignorance and folly. If we would take the trouble to reflect upon the advantages which result from the alternation of day and night, we should not shew such want of judgment, or make such irrational complaints, but praise our Creator for the benefits of night. Of this truth I wish to convince my readers. Perhaps they will set a greater value upon

the night when they have considered its tendency to amend the heart.

Every one must be convinced of the moral utility of night, who reflects that it interrupts the course of most vices, or at least of such as are most pernicious. Darkness obliges the tormentor of his fellow-creatures to relax his cruelties, and oppressed virtue gains a few hours' repose. The fraudulent tradesman is obliged at night to desist from cheating his neighbors, and its arrival checks a thousand irregularities. If men could dispense with sleep for twice the length of time which, by the present arrangement of Nature, they are enabled to do, to what a pitch of wickedness would they arrive, and to what a degree would every species of guilt be multiplied! By the uninterrupted practice of vice the wicked would attain a horrible proficiency in iniquity. We may therefore assert that the longer the nights are, so much the fewer crimes are committed in the space of twenty-four hours. This is assuredly not one of the smallest benefits which we derive from the night.*

* These sentiments of the author are so diametrically opposite to those which the translator entertains on this subject, that he cannot forbear entering his protest against them. He is firmly of opinion that the crimes perpetrated in the night, as well such as fall under the cognizance of the law of the land, as those for which men are amenable to no other tribunal than that of their own conscience, far surpass in number and turpitude the offences committed during the day. He is persuaded that many a man, shrouded, as he imagines, by the obscurity of night from the observation of every eye, is led, "nothing loth," either by his own passions, or by the example and persuasion of others, to the perpetration of deeds, from which, in the broad face of day, he would have shrunk with horror. T.

Moral uses of night.

Of how much instruction and mental delight should we be deprived, if there were no night! How many wonders of the creation presented by the starry firmament, would then be concealed from our view! But now, when every night manifests in those resplendent orbs the majesty of our Creator, we may elevate our hearts to him, and be the more deeply impressed with a sense of our own insignificance. If every occasion that recals God to our minds ought to be precious in our eyes, how highly ought we to value the night, which so emphatically proclaims the grandeur of the Deity! Ah! if we would but pay attention to this subject the nights would never appear too long; we should find occupations, for the sake of which we should be tempted to wish them still longer, and a single night spent in the meditation of the wonderful works of God, would have a salutary influence over our whole lives. Come then, reader, consider attentively the immense theatre of the divine miracles which night unfolds to your view. A single good thought excited by this magnificent spectacle, with which you fall asleep when you retire to rest, which recurs to your mind when you awake in the morning, and which you cherish during the day, may be productive of great and permanent benefit to your soul.

To those who are fond of meditation night is a desirable season. The bustle in which we commonly live during the day allows us very few intervals and opportunities for disengaging ourselves from the earth, and seriously reflecting on our duties, and the purposes for which we are created. The silence of night invites us to this salutary occupation, and facilitates our meditations. We may

then commune, without interruption, with our hearts, and study the important science of knowing ourselves. The soul may then collect its scattered powers, and direct them toward those subjects which concern our everlasting happiness This is the time to obliterate bad impressions, and to fortify our souls against the seductive power of vicious examples. Undistracted by other objects, we may then reflect on the awful moment of our dissolution, and the important consequences of death. The silence and the solitude of our closets are favorable to religious sentiments, and excite in our souls a desire to encourage them.

Let us then employ each returning night to this salutary purpose. Instead of complaining of this arrangement, I will return thanks to God for having created the vicissitudes of light and darkness. I will bless each night in which I acquire a more intimate knowledge of my own unworthiness and the divine perfection, and in which I become wiser unto salvation.

## *SEPTEMBER* 24.

### OF THE INDIFFERENCE OF MAN TOWARD THE WORKS OF NATURE.

WHENCE proceeds that indifference, and even contempt, which is shewn by many towards the works of God in Nature? This is a question, the answer to which will lead us to some important results.

Some disregard the works of Nature from inattention. We are so accustomed to the spectacle of that order and beauty which pervade the creation, that we forget to admire the wisdom of these divine

productions, and to be thankful for the numerous advantages which we derive from them:—and that merely because we are constantly in possession of them. Too many resemble the brutes which graze the mead and drink at the stream, without reflecting on the great author of all good things, or discovering any wisdom and design in their production. So it is also with men, who, though endued with superior faculties, and enjoying, on that account, a far greater share of the blessings of Nature, yet scarcely bestow a thought on the source from which they flow. Even in those cases in which the divine wisdom is most strikingly displayed, habit produces inattention and indifference, instead of exciting gratitude and admiration.

Ignorance renders a great portion of mankind regardless of the beauties of Nature. How great is the number of those who are wholly unacquainted with the most common of her phenomena. They daily see the sun rise and set; they behold their fields from time to time watered with rain, refreshed with dew, or covered with snow; every spring presents the most astonishing changes to their view; and yet how few give themselves the trouble to enquire into the nature, causes, and purposes of these phenomena! There is much, indeed, that we are unable to comprehend, notwithstanding all the attention we may bestow on the investigation; and nothing so soon convinces us of the narrow limits of our intelligence as when we attempt to fathom the operations of Nature. Our faculties, however, allow us to acquire at least an historical knowledge of her works. The most illiterate rustic may comprehend in what manner his corn sprouts forth, if

he will but take the trouble to enquire into the subject.

Others despise the works of Nature from motives of self-interest. I have no doubt that we should have more attentive and assiduous observers of Nature, if, for instance, the spider spun gold thread, if the lobster contained pearls, or if the primrose could restore to old age the vigor of youth. We are too apt to value things merely with relation to our interest or our caprices. Such objects as afford no immediate gratification to our inordinate desires, we deem unworthy of our regard: nay, so perverse is the nature of our selfishness, that we pay no attention to things which are of the greatest utility to us. Corn is the vegetable production most indispensably necessary for our support, and yet we pass whole tracts covered with this useful plant, without deigning to bestow on it one single reflection.

Many neglect the contemplation of Nature from indolence. They are too fond of their ease to abridge themselves of a few hours' repose, for the purpose of contemplating the star-bespangled firmament; they cannot think of quitting their beds before the usual time to behold the rising sun; and would not fatigue themselves by stooping to the ground to examine the curious structure of a blade of grass. And yet these very people who are so fond of their ease and convenience, are indefatigable in any thing that relates to the gratification of their passions. The toper and the gambler would deem it the severest of punishments to be obliged to spend the hours which they are accustomed to pass at the tavern and at the gaming-

table, in the contemplation of the starry heavens. A person who is fond of walking, and would think nothing of going many miles to see a friend, would be highly displeased were you to endeavor to persuade him to make ever so short an excursion for the purpose of inspecting any remarkable object in Nature.

Another portion of mankind despise the works of God in Nature from irreligion. They have no desire to learn to know the greatness of God. They have no taste for religion, and the obligations which it imposes. To praise God, and to love him for the benefits he has conferred, would be to them the most irksome of duties. There is too much reason to believe that this is one of the principal causes of the indifference of mankind to the works of the Deity. If they prized the knowledge of God above all other things, they would eagerly avail themselves of every opportunity of extending their knowledge, and strengthening their love of the Creator.

To these classes belong probably two thirds of the inhabitants of the globe. So much, at least, is certain, that the number of those is very small who study in a proper manner the works of God in Nature, and receive from them that delight which every attentive observer of these objects experiences. This is a melancholy truth which is daily confirmed. Would to God that men would at length be convinced how ill it becomes them to remain so insensible and inattentive to the great works of the Creator, and how they degrade themselves by such conduct below the brute creation! Have we eyes, and shall we not contemplate the wonders with which we are every where surrounded? Have we ears, and shall we not listen to the

anthems of praise which resound from every part of the creation? Are we desirous to contemplate God in a future life, and yet do we refuse to consider him here on earth in his admirable works? O let us renounce our culpable indifference, and endeavor to catch a portion of that extacy which filled the soul of the royal Psalmist, whenever he reflected on the greatness and majesty of his Creator!

## *SEPTEMBER 25.*

### NOCTURNAL METEORS.

In serene weather we often observe a circular light, or large luminous ring, surrounding the moon. This ring often faintly exhibits the colors of the rainbow, especially round its exterior circumference. In the centre of it is the moon, and the interior space is generally darker than the rest of the sky. When the moon is at the full, and considerably elevated above the horizon, this ring appears the brightest. It is often very large. We must not imagine that there is in reality a circle of this kind round the moon, but it is produced in the vapors of our atmosphere by the refraction of the rays of that luminary.

Two or more false moons are sometimes observed near the real moon. About the latter appear luminous or colored circles, and within these, by the side of the real moon, are seen the mock-moons, which are as large, but their light is fainter and more colored. Sometimes they have luminous tails. This phenomenon is likewise produced by refraction. The light of the moon falling upon aqueous or frozen vapors, is refracted in different ways, and

separated into colored rays, and presents to the eye an image of the moon, in consequence of the vivid reflection of the rays of light from certain parts of the circles. Sometimes, but very seldom, lunar rainbows are observed by moon-light in rainy weather; these have the same colors as the solar rainbow, but much fainter, and are likewise occasioned by the refraction of the rays of light.

When sulphureous and other vapors take fire in the upper regions of the atmosphere, we often see trains of light darting rapidly along, like rockets. When these vapors unite into a mass, and, becoming ignited, fall down towards the earth, they appear like small globes of fire descending from the sky; and as they seem from their distance to be about the size of a star, they have been by some denominated falling stars. Ignorant people imagine that they are real stars, which shoot from their places, and are dissipated, or at least purged and purified. Sometimes these falling stars are seen slowly descending with extraordinary splendor and beautifully colored, and acquiring new lustre as they approach, till they are at length extinguished in the humid vapors of the lower atmosphere, and fall upon the earth, as it is said, in the form of a viscous and gelatinous substance. Balls of fire have likewise been seen of much larger dimensions, and more resplendent than the full moon, and some of which have long luminous trains. It is probable that they are chiefly composed of sulphureous and nitrous vapors, accumulated and ignited; since they in general pass through the air with great velocity, and burst with a loud report: but sometimes, when their component parts are of a diffe-

rent nature, they are extinguished without noise in the upper regions of the atmosphere.

The flashes of light which are frequently observed in hot summer-nights, proceed from the vapors of the atmosphere, which are so much the more imperceptible, the more elevated they are. In general, however, these flashes are the reflection of lightning which is too distant for the thunder to be heard. A flash of lightning which is a mile from the earth's surface, may be seen at a distance of ninety miles, and its reflection still farther, but thunder cannot be heard above ten or twelve miles off.

Various other meteors, to which different fanciful names have been given, according to the imaginary figures they assume, are nothing but gross and viscous exhalations, which ferment in the humid regions of the lower atmosphere, and, from the motion of the air, exhibit every kind of singular form. By the mixture of certain substances different naturalists have produced imitations of these phenomena on a small scale.

The Aurora Borealis is one of the most remarkable, and often one of the most magnificent of all the nocturnal meteors. It is generally seen from the beginning of autumn till the commencement of spring, when the air is serene, and the moon does not shine very bright. The Aurora Borealis is not always attended with the same phenomena. Sometimes it has the appearance of a light in the northern point of the hemisphere, resembling the first dawn of day. Sometimes we observe streaks of light and white luminous clouds, which are constantly in motion. But when this meteor appears

in full perfection, a dark space is first seen in calm, serene weather, at the horizon, towards the north. The upper part is bordered by a whitish light, whence soon afterwards issue brilliant rays and resplendent columns, which, as they rise, assume a yellowish or reddish color, then meet, unite, and form luminous but opaque clouds; and at length form a crown, or oblong circle of the most beautiful purple, intermingled with white, blue, and other colors, emitting brilliant rays, or flashes of light. 'Tis then that this phenomenon appears in all its splendor.

## SEPTEMBER 26.

### OF AMPHIBIOUS ANIMALS.

BESIDES the quadrupeds, birds, and fishes, there is another class of animals which can live either in water or upon land, and which on this account is called amphibious. Some species of the animals of this class are cold-blooded, and all of them have something gloomy and forbidding in their look and figure; their color is dark and disagreeable; and they have an unpleasant smell and a hoarse voice. Many of them are also extremely venomous. Instead of bones, they have, in general, only cartilages. The skin of some is smooth, and others are cased in shells. Most of them live concealed in muddy and filthy places. Some of these animals are viviparous, and others oviparous. The latter do not hatch their eggs themselves, but leave them to be brought to maturity by the warmth of the air or water, or even of dung. Almost all the species belonging to this class live upon prey, which they

take either by force or stratagem. They can in general endure hunger for a long time, and are exceedingly tenacious of life. Some move upon feet, others creep on their bellies, and for this reason they are divided into two classes.

To the first class belong those amphibious animals that have feet. The tortoise, which is one of the species of this class, is covered with a hard shell resembling a shield. Those which reside on the land are the smallest; the sea-tortoises considerably exceed them in size, being frequently of the weight of eight or nine hundred pounds. Of all amphibious animals the crocodile is the most formidable. Proceeding from an egg not larger than that of a goose, it attains the prodigious length of twenty or thirty feet. It is extremely cruel and voracious, and its cunning makes amends for the unwieldy dimensions of its body.

Serpents form the second class of amphibious animals. They have no feet, but creep by an undulatory motion, by means of the scales and rings of which their bodies are composed; to which end their spinal vertebræ have a peculiar construction. It is said that certain species of serpents possess the property of fascinating the small animals on which they prey, to such a degree, that they drop of themselves into the jaws of their formidable enemy. It is possible that these animals may be stupified by the looks or by the exhalations of the serpents. The latter can open their jaws to such an extent as to be able to swallow animals of larger bulk than their whole head. Some serpents, forming about the tenth part of the whole genus, are provided with fangs, nearly resembling the other teeth. By means of these, when they bite any animal, they

infuse into the wound a poisonous fluid, which is ejected from a little bag placed at the root of the tooth. This poison possesses the peculiar property of being pernicious to wounds, though it may be taken internally without danger. Besides the serpents that are thus armed, no others are venomous, though some species attack men and animals with as much fury as if they could hurt them. The rattle-snake is the most dangerous of them all. It is, in general, from three to four feet in length, and as thick as a man's thigh. It has a strong and disagreeable smell, which, as well as the rattle, seems to have been given it by Nature to warn mankind of its approach. This reptile is fiercest when hungry, and in wet weather. It never bites till it has coiled itself into a circle, which movement it performs with astonishing velocity. To roll itself up, to erect itself upon its tail, to dart upon its prey, to wound it, and to retire, is with this serpent the work of a moment.

Many of my readers will perhaps be inclined to ask why God has created this class of animals, many, if not the most of which, seem to exist only for the torment and destruction of men. This, and other questions of the same kind, but too clearly evince our selfishness, and our disposition to find fault with the works of the Almighty. Considered in this light, such questions are always indecorous and reprehensible: but if we ask them for the purpose of obtaining a more thorough conviction of the wisdom and goodness of God, in respect to all created objects, it is not only commendable, but even necessary for every reflecting mind to enquire for what purpose God has created such and such things, which appear to be pernicious to us. To

you then, my dear reader, who wish for information on this subject, I now address myself. You perhaps imagine that such animals as crocodiles and serpents could not have been created for the general benefit of the world: but this is an erroneous opinion. Admitting that these classes of animals do considerable mischief, yet all the individuals belonging to these classes are not pernicious. Is it not a proof of the especial goodness of God, that no more than the tenth part of serpents are venomous? Even these are so organized that it is generally possible to avoid them. However dangerous, for example, the rattle-snake may be, yet the warning which it gives of its approach, enables the animals of which it is in pursuit to escape. The disagreeable smell and the rattle of this animal warn us of the danger of going too near it. The Creator hath moreover opposed to this animal an enemy by which it may be destroyed. The wild hog is very diligent in seeking the rattle-snakes, and devours them with the greatest avidity. It is also worthy of remark, that a child is strong enough to kill the most formidable of these reptiles. A slight stroke with a stick across the back kills them, either on the spot, or at farthest in the space of a quarter of an hour. How unjust it would be, were we merely to estimate the mischief they occasion, without taking into account the advantages we derive from them. Some amphibious animals serve us for food; others furnish us with medicines; and the shell of the tortoise is used for various purposes.

In short, the wisdom and goodness of God are conspicuously displayed in this, as in all his other dispensations. To reflect on these his attributes, to admire and to adore them, is our duty when we

see animals which appear to be injurious to us. Never let us find fault with his arrangements, or murmur against his ordinations. This is so much the more culpable, the less our limited faculties are capable of comprehending the various uses for which animals may be designed.

## *SEPTEMBER 27.*

### PERFECTION OF THE WORKS OF GOD.

WHAT can be compared with the perfection of the works of God! Who can describe the glory of the omnipotence displayed in them! The Creator was not content with exciting our astonishment by the magnitude, the number, and the variety of his wonderful works; but each of them manifests infinite art, each is perfect in its kind, and even the most minute evince in their structure and proportions the unbounded intelligence of their divine author. We are justly amazed at the different arts which man has invented. By means of these we perform things, which, to our comparatively unenlightened ancestors, would have appeared supernatural. We measure the height, the breadth, and the depth of bodies; we are acquainted with the courses of the stars; we direct the currents of rivers; we can raise or compress water, construct habitations that float on the surface of the ocean,*

* "Of all the arts and professions that have at any time attracted my notice," says the ingenious author of the *History of Voyages and Discoveries made in the North*, "none has ever appeared to me more astonishing and marvellous than that of navigation, in the state in which it is at pre-

and execute many other works that do honor to the human understanding. But what are all human inventions, what are the most magnificent productions of man, compared with the least of the works of the Almighty! What imperfect imitations! How inferior is every copy by the hand of man to the divine original! Let a skilful artist exert all his talents to give a work the most useful and convenient form; let him bestow ever so much care on the execution; let him finish and polish it as highly as he pleases; and after all his pains and all his ingenuity, let him examine his performance with a microscope. How rough, how coarse, how ill-shaped it will appear! On the contrary, the works of the Most High, whether examined with the naked eye, or with the aid of our optical inventions, are always beautiful and perfect.

Divine omnipotence hath, indeed, formed and arranged every part of the bodies it hath created with inimitable skill, harmony, and proportion. It is the prerogative of a power which knows no bounds, that each of its works is perfect in its kind. In all its productions, from the greatest to the smallest, the most admirable order prevails. So

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sent. This art affords one of the most certain and irrefragable proofs of the amazing powers of the human understanding. This cannot be made more evident than when taking a retrospective view of the tottering, inartificial craft, to which navigation owes its origin, we compare it with a noble and majestic edifice, containing a thousand men, together with their provisions, drink, furniture, and other necessaries for many months, besides one hundred pieces of heavy ordnance, and bearing all this vast apparatus safely, and, as it were, on the wings of the wind, across immense seas, to the most distant shores." T.

harmonious are the relations which each bears to the other, that no void is to be found, that in the immense chain of created beings not a single link is wanting; that nothing is out of place or defective; that each part is indispensably necessary to the perfection of the whole; whereas, separately considered, it still appears equally complete and equally perfect. Who can describe the infinitely diversified beauties, the innumerable combinations of rich and pleasing colors, and the variegated hues of the meads, the vales, the mountains, the woods, the plants, the flowers, the stones, and other objects! Which of the works of God is not distinguished by some characteristic beauty? Is not that which is the most useful, at the same time the most agreeable? What an astonishing variety of forms, figures, and dimensions do we not discover merely in the objects that compose the inanimate creation? Still more inexpressible is the number of animated creatures, and yet each individual is perfect in its kind. How infinite then must be the power of that Being, at whose fiat alone all the works of creation started into existence!

But to admire the greatness and the power of God, we have no occasion to go back to that period, when, by his command, every being sprung forth from nothing, in which God created all things by the word of his power, and saw that they were good. Is not a new creation presented with each returning spring to our view? What can be more astonishing than the revolution which then takes place on the surface of the earth? At the close of autumn, the vallies, the meadows, the forests seem to expire, and winter strips them of their beauties. The animals languish; the birds hide themselves,

and are silent; all is dreary and desert, and Nature appears to be seized with an universal torpor. Meanwhile, the secret influences of the divine power are preparing, unseen and unnoticed by us, the general renovation of Nature. Life reanimates the torpid bodies, and every thing seems to experience a new resurrection.

O how can I so often witness this magnificent spectacle, and not be filled with the most profound awe and admiration of the greatness, the glory and the omnipotence of the Eternal! Is not the volume of Nature replete with divine revelations as well as the sacred Scriptures? May I never behold a spreading tree, a waving corn-field, a flower-enamelled mead, a majestic forest, may I never pluck a flower, or enjoy the delights of the garden, without reflecting that it is God who causeth the tree to cast such a refreshing shade; that it is he who hath imparted such beauty and such fragrance to the flowers; that it is he who hath clothed the forests and the meads with such pleasing verdure; that it is he who hath made bread, and oil, and wine to spring forth from the earth, to make glad the heart of man. Transported with gratitude, love, and admiration, I will then exclaim: "O Lord, how manifold are thy works; in wisdom hast thou made them all: the earth is full of thy riches."

## *SEPTEMBER* 28.

### OF FRUITS.

WE are now in the season in which the Creator manifests his goodness in the dispensation of so

many different kinds of fruit. The charms of summer are succeeded by more solid pleasures; and delicious fruits now occupy the place where beauteous blossoms once delighted the eye. The apple, glowing like burnished gold, and streaked with purple, bows down the branch that bears it; the luscious pear, and the plum, which vies in sweetness with honey, display their beauties, and invite the hand of the owner. We should be inexcusable, if, at the sight of these blessings, we were not to indulge some serious reflections, or to endeavor to sanctify the pleasures of autumn by bestowing a thought on the bounty of our Creator.

How wisely hath God distributed fruits through the different seasons of the year! Though summer and autumn are the seasons at which Nature presents us with these gifts, yet, with the aid of art, we are supplied with them in spring and winter, and our tables are provided with some kinds of fruit all the year round. In June, Nature spontaneously furnishes us with raspberries, currants, gooseberries, and cherries. July supplies our tables with peaches, apricots, and some kinds of pears. August yields us in still greater abundance, figs, late cherries, and a variety of delicious pears. September provides us with the early produce of the vine, winter pears and apples. October presents us with various kinds of pears, apples, and grapes. With such wise economy doth Nature dispense her gifts that we may not be cloyed by their abundance, and that our palate may be gratified by a continual variety. It is true that as winter advances, the number of good fruits begins to diminish; but art has instructed us how to preserve a considerable quantity, even in that season. God would not spare

man the little trouble which this requires. He designed that man should be kept by his wants in a state of constant activity. For this reason he hath distributed his gifts at such different seasons, and hath so formed them that they spoil or degenerate when the necessary care and attention are denied them.

How great is the profusion of the fruits with which the earth supplies us! Notwithstanding the depredations of birds and insects, we have still such abundance left as not to feel this loss. Calculate, if it be possible, the quantity of fruit produced in good years by one hundred trees, and you will be astonished at the prodigious, nay, infinite multiplication. And why is there such a profusion of fruits? For the propagation of the species of trees which bear them, a much less quantity would have been more than sufficient. The Creator, therefore, evidently designed them for the nourishment of man, and especially for the use of the poor and the indigent. To such he has given in fruits a cheap, nutritious, and wholesome food, so that they have no occasion to envy the rich their costly, and often pernicious delicacies.

Few things are more salubrious than fruit. It is a dispensation of the providence of God, which calls for our gratitude, that he has bestowed fruits upon us chiefly in that season, when they are at the same time a refreshment and a medicine. Apples come very seasonably during the heats of summer, as they tend to cool the blood, the stomach, and the intestines. Plums have an acid sweetness, and an unctuous and emollient juice, which renders them serviceable in diet in various ways. They operate as gentle purgatives, and cor-

rect the sharpness of the bile and other humors, which so often produces shiverings and agues. And if there are certain fruits, the use of which may be prejudicial to our health, as it has been asserted, and not without reason, of peaches, apricots, and melons, this only proves that they were not designed for our climate, or for those persons who cannot obviate, by wine and spices, the bad effects resulting from the very cooling properties of those fruits.

Nothing is more grateful to the taste than fruit. Notwithstanding the prodigious number of the species, each has a taste peculiar to itself. Fruits would certainly lose much of their value if they had all the same flavor. This variety renders them so much the more agreeable; and in this particular God approves himself a tender father, who not only supplies his creatures with food, but likewise ministers to their pleasures.

While I enjoy the various kinds of fruits, let me not then forget the goodness of that Being who bestows them. Be it my constant endeavor to devote myself to the service of so bountiful a Father as my Father who is in heaven. How great will be my happiness if I dedicate myself entirely to him! What pleasures shall then be my portion, and what glorious hopes of future felicity may I indulge!

## *SEPTEMBER 29.*

### SONG OF PRAISE.

*Imitated from the 147th Psalm.*

PRAISE the Lord, for he is omnipotent! He telleth the number of the stars, he calleth them all

by their names. Thou earth, and ye heavens, celebrate him; his name is great and glorious; his sceptre rules with majesty. Give glory to the Omnipotent!

Unite your voices to bless the all-bountiful God! come to him, ye distressed; come to your Father, for he is merciful and compassionate; every thing proves that he is a God of love and of benignity.

He darkeneth the heavens, but it is to water the earth with genial rains. Our fields are covered with verdure: the grass grows, the fruits ripen, for the clouds shower down his blessings upon us. How full of loving kindness is the Eternal!

Let every thing that breathes glorify the Lord! Birds and fishes, quadrupeds and insects are none of them forgotten. They are all the objects of his care; they are all supported by his gifts. Let us praise and celebrate our heavenly Father.

O how bountifully he dealeth with those who fear him, and put their trust in his loving kindness! One friend is often unable to assist another, and the utmost strength of man cannot save him from danger. Woe to the man who places his trust in vain supports! Confide, then, my brethren, in the Rock of Ages, in your Saviour and your God!

Give thanks unto him for having made known unto us his will; for having given us his laws and his commandments. His word is a source of life and of salvation. O ye people of his covenant, how great is your felicity! Praise, celebrate, and exalt the God of truth!

## SEPTEMBER 30.

### HYMN OF PRAISE,

*From the 148th Psalm.*

Begin, my soul, th' exalted lay!
Let each enraptur'd thought obey,
And praise th' Almighty's name:
Lo! heav'n and earth, and seas, and skies,
In one melodious concert rise
To swell th' inspiring theme.

Ye fields of light, celestial plains,
Where gay, transporting beauty reigns,
Ye scenes divinely fair!
Your Maker's wond'rous pow'r proclaim,
Tell how he form'd your shining frame,
And breath'd the fluid air.

Ye angels, catch the thrilling sound,
While all th' adoring thrones around
His boundless mercy sing:
Let every list'ning saint above
Wake all the tuneful soul of love,
And touch the sweetest string.

Join, ye loud spheres, the vocal choir;
Thou dazzling orb of liquid fire,
The mighty chorus aid:
Soon as grey ev'ning gilds the plain,
Thou, moon, protract the melting rain,
And praise him in the shade.

Thou heav'n of heav'ns, his vast abode,
Ye clouds proclaim your forming God,
Who call'd you worlds from night:
"Ye shades, dispel!" th' Eternal said;
At once th' involving darkness fled,
And Nature sprang to light.

Hymn of praise, from the 148th Psalm.

Whate'er a blooming world contains,
That wings the air, that skims the plains,
United praise bestow:
Ye dragons, sound his awful name
To heav'n aloud; and roar acclaim
Ye swelling deeps below.

Let ev'ry element rejoice:
Ye thunders, burst with awful voice
To him who bids you roll;
His praise in softer notes declare,
Each whisp'ring breeze of yielding air,
And breathe it to the soul.

To him, ye graceful cedars, bow;
Ye tow'ring mountains, bending low,
Your great Creator own!
Tell when affrighted Nature shook,
How Sinai kindled at his look,
And trembled at his frown.

Ye flocks that haunt the humble vale,
Ye insects flutt'ring on the gale,
In mutual concourse rise:
Crop the gay rose's vermeil bloom,
And waft its spoils, a sweet perfume,
In incense to the skies.

Wake, all ye mounting tribes, and sing;
Ye plumy warblers of the spring,
Harmonious anthems raise
To him who shap'd your finer mould,
Who tipp'd your glitt'ring wings with gold,
And tun'd your voice to praise.

Let man, by nobler passions sway'd,
The feeling heart, the judging head,
In heav'nly praise employ;
Spread his tremendous name around,
Till heav'ns broad arch rings back the sound,
The gen'ral burst of joy.

Hymn of praise, from the 148th Psalm.

Ye whom the charms of grandeur please,
Nurs'd on the downy lap of ease,
Fall prostrate at his throne:
Ye princes, rulers, all adore;
Praise him, ye kings, who makes your pow'r
An image of his own.

Ye fair, by Nature form'd to move,
O praise th' eternal source of love,
With youth's enliv'ning fire:
Let age take up the tuneful lay,
Sigh his bless'd name, then soar away,
And ask an angel's lyre.*

The reader will not be displeased to find that I have adopted the animated strains of Ogilvie, instead of giving a literal translation of the author's paraphrase. T.

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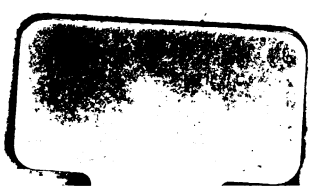
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